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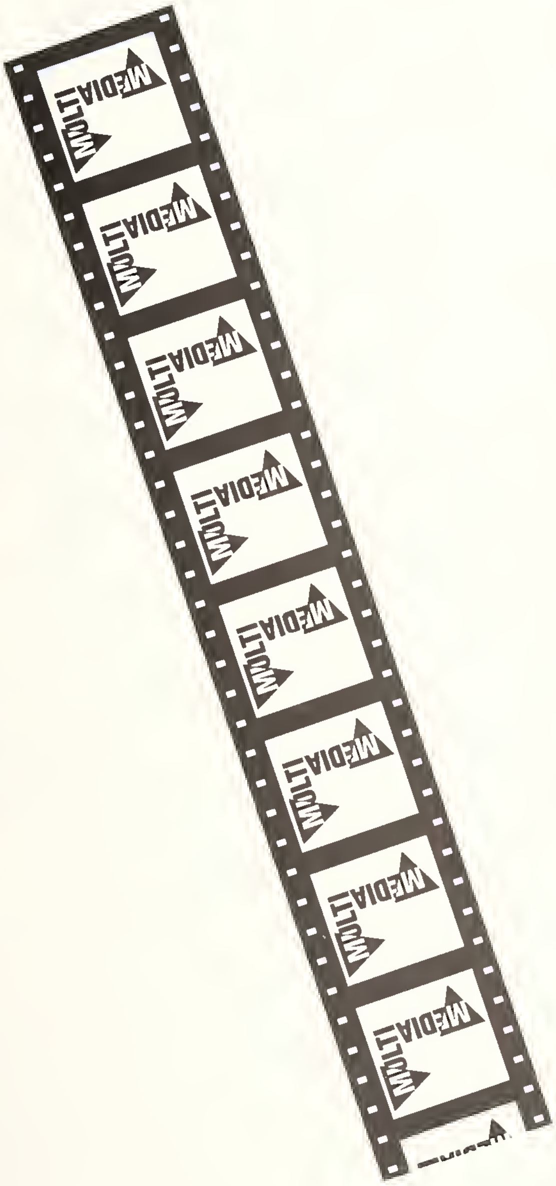

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MEDIA

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This newsletter was entirely produced on a Macintosh using PageMaker and other related Macintosh software.

Multimedia:
An Introduction.

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In art, the term "multimedia" refers to a work which contains sections created by using different artistic media. Similarly, a computer multimedia presentation is one in which the computer co-ordinates the display of different types and sources of material: text, still graphics and animation, video, and audio.

Multimedia is a major topic in the personal computer world right now. Though the focus in the computer mainstream is on multimedia for business presentations, parts of the University use multimedia in teaching. Some faculties have been using multimedia for some time now, after having introduced it into their courses at various undergraduate levels. Given that multimedia is a growing phenomenon, particularly in education, it is worth considering its uses in other areas of the University.

In this issue of *ComputerNews*, we have written a series of articles that introduce various topics related to multimedia. We will continue the discussion in future issues – reviewing various pieces of multimedia software and hardware in more detail, and, if possible, discussing the various multimedia projects that take place at the University of Toronto today.

What separates multimedia from, say, a videotape or a film? The essential difference is that a multimedia presentation is interactive; that is, you choose what you want to see in whichever order you want. The fact that different material can be selected at any particular moment makes multimedia useful both in the classroom (where, for example, a student question may require the instructor to show a video not originally planned in the presentation), and in the computer lab (where students interact one-on-one with the material, and can control the pace of the presentation, as well as alter the order of the material to suit their own needs).

Most personal computers made in the past year or so are suitable as basic multimedia platforms. Most of them have sufficient hardware to show both text and graphics on the screen, and any software necessary to do this is readily available. Furthermore, adequate animation software is available for these same machines, although computer animation is a more demanding task. For the presentation needs of many disciplines, the basics provided by any modern Macintosh or IBM PC might well be enough. But for other

The essential difference is that a multimedia presentation is interactive; that is, you choose what you want to see in whichever order you want.

applications, a complete multimedia toolkit might require access to video and/or audio sources. "Authoring" software will be needed by everyone: it allows you to assemble the various pieces into a single presentation.

Authoring and presentation software is available for both the major personal platforms at U of T: the Macintosh and the IBM PC. The Macintosh got the first inexpensive yet powerful authoring software when HyperCard was introduced. It is essentially free, since Apple includes it with every Macintosh it sells, and the new HyperCard promises to be significantly better (see the review by Paul Forage in this issue of *ComputerNews*). Nowadays, similar software exists for the IBM PC – although none of the commercial products there are free, unfortunately. Two packages used at U of T are **Linkway** and **Toolbook**. More sophisticated but also more expensive platforms for the IBM PS/2 are also available, including special packages built to work with IBM's touchscreen (InfoWindows) and the Audio Video Connection package.

Although you can produce a multimedia presentation without video, most people associate video with multimedia. It would seem reasonable to expect that you would use motion video on your personal computer in the same way you use other materials – save it in a digital computer file, and, when desired, play it to your screen. This is indeed the way things will be some time in the future. For now, there is a problem related to the size of files that your personal computer would have to handle. Video is divided into a collection of still frames (similar to the individual pictures of a movie). The effect of motion is achieved by showing the frames very quickly – North American TV shows 30 of these frames per second. Since conventional (uncompressed) digital representation of a single digital frame currently takes hundreds of kilobytes (about 400KB), and to display a one-second video would require the computer to move 30 times that amount to the screen in one second, it is easy to see that such capability is beyond today's personal computers – the data simply moves too fast! The amount of disk space to store, say, 30 minutes of video would be enormous; even one second of motion video could take 30 x 400KB, or 12 megabytes (MB).

It is important, however, to realize that the signals used to put the image on your computer screen and on your television are different.

Currently, the term "video" in multimedia does not imply a computer-like digital representation. Instead, it generally refers to the type of video signal used by your television (the North American convention for television signals is called "NTSC"). The signal your television understands and the signal put out by your VCR both follow the NTSC standards. It might seem that the personal computer always uses video as a matter of course – the computer monitor is nothing but a "video display screen" after all. It is important, however, to realize that the signals used to put the image on your computer screen and on your television are different. For this reason, for modern microcomputers, the display and handling of video on the computer screen is more complex than it might seem, particularly if you want to combine video material in NTSC form with computer-generated text or graphics on the screen at the same time. However, the value of video in computer presentations is obvious. For one thing, since the images come from conventional video, real-life situations can be shown. Furthermore, a wealth of useful images are available only on NTSC video.

How do current computer-assisted presentations using video work then? Normally, the video is stored on a disk called a videodisc, and the videodisc player feeds the images to a separate video screen. The computer's role is only to control and direct the videodisc player to select appropriate portions from the videodisc. (More details will be discussed in Terry Jones' article, "Multimedia and Video," on page 17.)

To produce your own motion video sequences and package them in such a way for use in a multimedia presentation may be too expensive for most projects on campus to justify the expense. You can, however, make use of pre-packaged material currently available from commercial vendors. Many of these packages are created for individual student use, but some are designed to be used by the instructor in class. Although much of it is for the high-school market, some of it is aimed at the university undergraduate. For a sampling of these, see Hua Ji's article "Multimedia Works in the UTCS Library."

Audio presents problems similar to video for the personal computer. Although the digital representation of audio is relatively common (your home Compact Disc (CD) player reads the music stored digitally on the CD), most personal computers cannot easily handle the volume of digital information that even half an hour of digitized sound contains. The easiest approach is to use a CD player controlled by the computer and simply attach speakers or headphones to the player itself, so that the sound never goes through the computer at all. The computer

More and more presentations at academic conferences involve some multimedia elements: from the production of high-quality slides to the merging of video, audio and graphics via computer.

simply selects what portion of the audio material will be played and when to play it.

If you choose to use commercially-produced video or audio, you should consider whether or not you have the right to use it. Foreign films available on videodisc seem a natural language teaching tool. Unfortunately, few movie videodiscs give their buyers the right to show them in public settings – even in educational institutions. On the other hand, some companies, such as The Voyager Company, distribute many of their discs specifically for the educational market, and will grant educational institutions the right to use those discs in an educational setting. The right to use the video images and audio is an important issue you need to keep in mind.

What is a possible role of multimedia at the University? Clearly its biggest use is in teaching. Geoffrey Rockwell's article, "Multimedia in the Lecture Hall and Lab," discusses the uses of multimedia for teaching. As you will see there, instructors can easily supplement their lectures by using their computers to create slides or overheads. More advanced techniques can be used, where appropriate, to display pieces of video or audio, using the computer to easily select the segment whenever desired.

In some research-related activities, multimedia technology could be useful as well (particularly in engineering, medicine, and other sciences). More and more presentations at academic conferences involve some multimedia elements: from the production of high-quality slides to the merging of video, audio and graphics via computer. In a few research topics, computer-moderated video is useful. For example, many images from NASA are available in various optical disk formats.

If you are interested in looking more closely at possible multimedia applications for your discipline, we would be glad to be of assistance. We can help in several ways:

- We have a good cross-section of multimedia technology that we would be glad to show you. We have high-quality colour display capabilities on some of our Macintoshes and IBM PCs, and some video playing and colour scanning hardware and software. We have a single IBM Infowindows station, where students interact with the multimedia presentation by touching the screen. Furthermore, we have some authoring software for both the PC and Macintosh, and can show you how all the pieces can be put together. Finally, we have some packaged multimedia software that might give you some ideas, and catalogues from many of the major sources of educational multimedia. When you see the technology, you will have a better idea of how multimedia works.
- You may want to develop your own presentation. If so, keep in mind that poorly-designed presentations are much more difficult to use and understand. Often, the importance of design is neglected, and the effort to produce logically designed presentations is underestimated. Essentially, multimedia producers on personal computers do not need the skills of a programmer so much as the skills of a graphic designer. We can help you with many of the basic design issues. We have gained experience with these issues and have been involved (with researchers in the Faculty of Library and Information Sciences) in testing our designs with actual student users. Also, we continue to work on design standards for the University of Toronto that we hope will be adopted across the campus. If students see similarities in all the multimedia presentations they see, they can more quickly and accurately make use of any of them.
- Finally, we have some hardware that you can use as part of your multimedia production work:
  - laser printers with which you can make overheads from your word processor,
  - a colour slide maker,
  - a colour scanner which can take a colour image (for example, from a photograph) and convert it into a computer file;
  - a colour camera that stores its images on a small magnetic disk that can easily be connected to a computer, and
  - a frame grabber that can take a video "still" from a VCR, and convert it into a digital colour image.

There are other resources on campus that may also help you. The Media Centre can provide you with video equipment (such as videodisc players or monitors) for use in the classroom. A few large classrooms are equipped with colour video projectors. With these machines you can attach your computer or a video source (VCR or videodisc player), and project the image to the entire room. The Media Centre can also assist with video production, and offers workshops on various media-related topics.

Perhaps for some of you, multimedia might be an effective way to economically enhance undergraduate education at this University. If you would like to know more, please give me a call at 978-3995.

Multimedia in the Lecture Hall and Lab

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Multimedia works can be used to teach in two different ways: by presenting them in the lecture hall or by giving students access to these works in the computer lab. By computer lab, I mean an environment where students can interact with computers on their own. Many multimedia works can be used either way, but because there are issues specific to each approach, I will discuss them separately.

Multimedia in the Lecture Hall

The computer can be used to assist in the presentation of information in the lecture hall. From the preparation of slides to the manipulation of live video, the instructor can use the computer to make his/her presentations more sophisticated. There are two ways in which the computer can assist: 1) it can assist in the preparation of traditional presentation materials like overhead transparencies or slides; and 2) it can be used to navigate and order information during a presentation. Let us look at the preparation of slides:

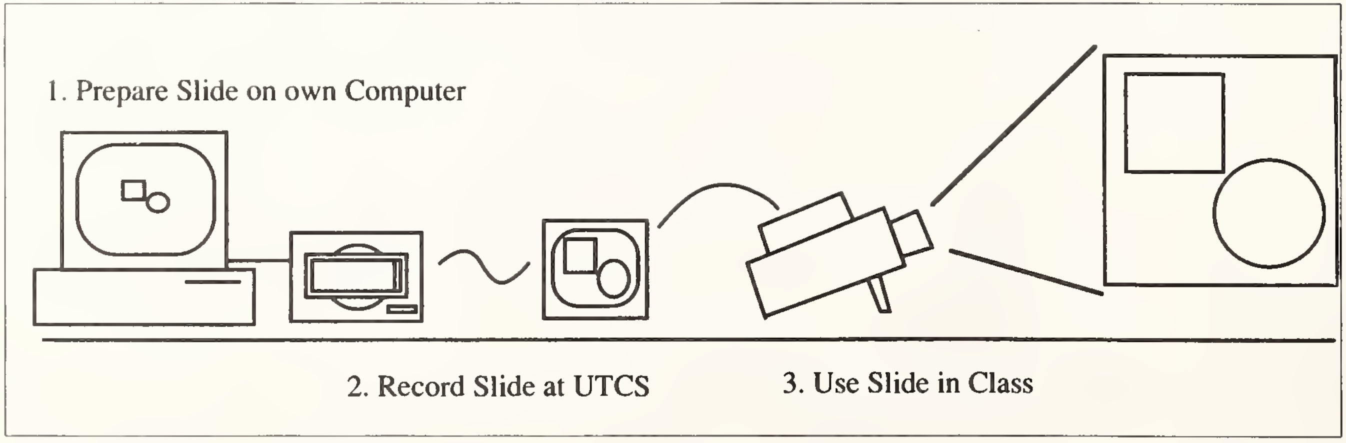
Slides

Slides have become a convenient way of presenting text and graphics to large audiences. Slides are portable; most lecture halls have slide projectors (or they can be ordered easily); and the image projected is good. In certain disciplines, slides are expected for formal presentations. The computer can be used to prepare the image that is to be recorded on slide film. You can arrange headings and graphs with software like Harvard Graphics and, when satisfied, record the result. UTCS has a modest slide recorder and there are commercial firms in Toronto that have higher quality recorders for those who are willing to pay. The Media Centre can help you with the design of your slides or provide tips on how to make an effective slide.

Overhead Transparencies

Another way in which the computer can assist is in the creation of overhead transparencies. Most people already have adequate word processors; they simply haven't thought of preparing presentation materials with them. With a word processor like WordPerfect, you can lay out text and graphics to be printed on transparencies. With desktop publishing programs like PageMaker, you can create complex transparencies. Certain printers, especially laser printers, can print directly on the transparencies. You can also print on

Figure 1: Slide creation.



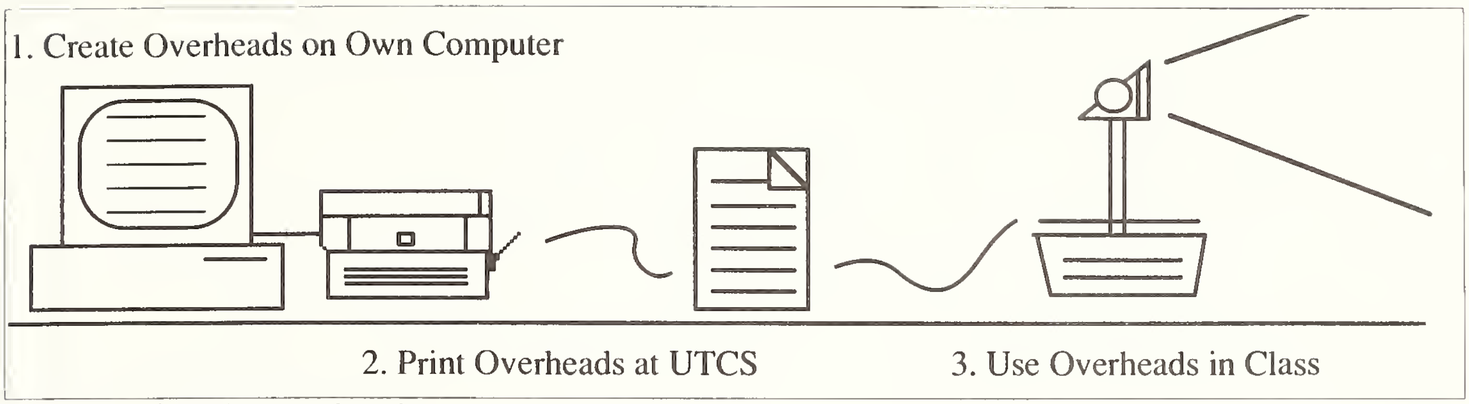

1. Create Overheads on Own Computer
2. Print Overheads at UTCS
3. Use Overheads in Class

Figure 2: Creating overheads.

paper and then photocopy the paper master onto transparencies, although the quality is not as good. All you need is a word processor that allows you to use large typeface sizes so that the text is visible to your audience. UTCS offers laser printing on paper or transparencies as a service from supported word processors. Again, the Media Centre offers workshops on effective presentations.

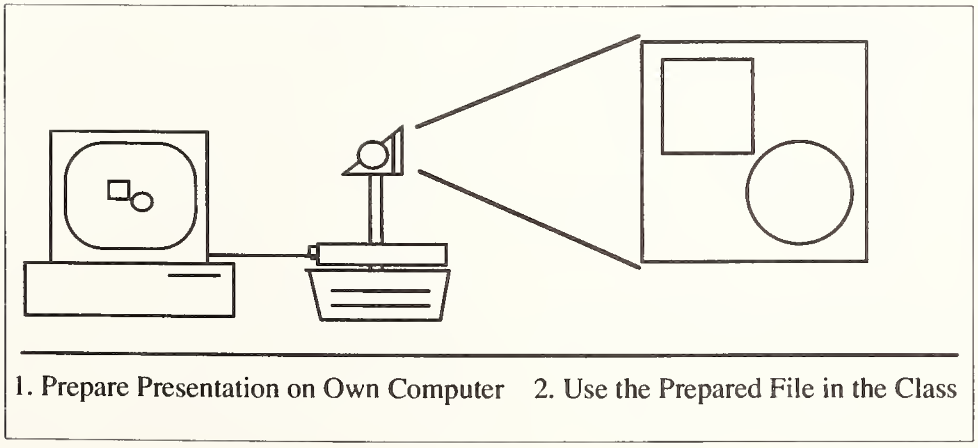
Overhead Panels

The computer can also assist in the lecture hall. Sorting and selecting transparencies can be time consuming and awkward. One approach is to eliminate the slides and transparencies and display the screen of your computer directly. In certain lecture halls, there are video projectors already installed which will project the screen of a colour computer. In smaller classes, one can use panels that are attached to the computer and sit on top of an overhead projector. The projector then projects the screen of the computer.

Overhead projection panels are best suited for smaller classes and projecting black and white screens (monochrome monitors). If you have images, simulations, text, or software to show students, this solution allows them to see exactly what you see when using the computer. Projectors work smoothly with any software that does not depend on colour, and although there are now colour panels too, they still need further refinement. Whatever software you use can be displayed and, if you have a whiteboard, drawn over. We use this sort of presentation system in the UTCS computer classes so the students can see what the instructor is doing.

There are certain disadvantages to these panels. They are not generally available unless you are willing to rent them from commercial firms. If you don't want to rent, you must buy them yourself. In addition, you need to have the computer attached to the panel, which means lugging your computer to class along with the panel. Until you can call a central service and order the overhead projector, panel, and appropriate computer, this solution will not be convenient for those without their own equipment.

Figure 3: Using a projection panel.


1. Prepare Presentation on Own Computer
2. Use the Prepared File in the Class

Projectors

A second solution is to use the video projection units that have been installed in certain lecture halls by the Media Centre. These ceiling projection units can project the screens of colour computers like a Mac II or IBM PC with VGA. To use these projection units with computers, you must first have these projectors calibrated for whatever computer you plan to attach to them. This calibration is not easy, so expect it to take an afternoon. As with the panels, you or your department have to provide the computer.

With the video projectors installed in certain lecture halls, you can also project video. This has some interesting applications. A videodisc can store half an hour of video on one side, thousands of still images, or a combination of still images and video sequences. This means, if you have a videodisc player hooked up to a projector, you can have a slide collection of 30,000 images available in the lecture hall. The problem is getting at the image you want. This

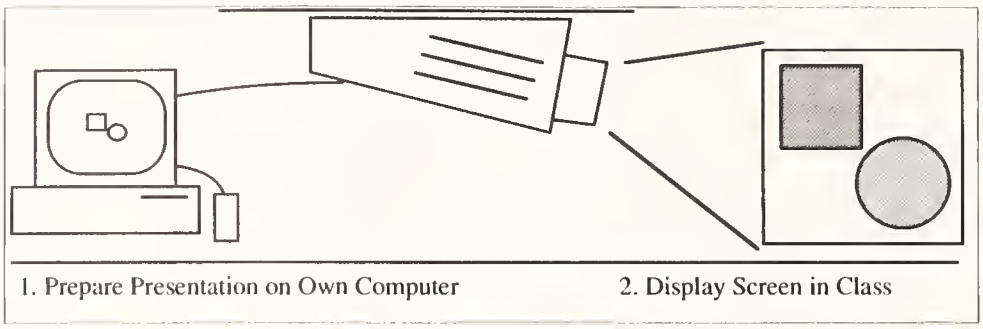

1. Prepare Presentation on Own Computer
2. Display Screen in Class

Figure 4: Using a video projection unit.

is where the computer comes in. For many of the commercially available discs (like the (US) National Gallery of Art disc, which has 1600 works of art from their collection), there is software that allows you to instantaneously access any particular image. The software is a database of all the images, with a short description and relevant information. If you want to show works by Georgione, you search the database for “Georgione” and the computer advances the laserdisc player to the appropriate frame on the disc, which in turn is projected for the students. There are discs with images for zoologists, botanists, chemists, musicians, and art historians. Some discs have video sequences such as short sequences of cells reproducing, or key parts of chemistry experiments too dangerous to perform. Other discs have archival material like speeches by Martin Luther King. Finally, there are complete movies, such as you would buy in VHS format, pressed on videodisc. Where the copyright permits, you can use the computer to navigate around the work.

If you decide to use panels or projectors for your presentations, there is special software that allows you to quickly create presentations and walk through them. One of the nicest is **More II** for the Macintosh. It is an outliner where you can outline a presentation combining graphics and text. It will then turn your outline into a set of bullet charts that cover the screen and are adapted for projection. Clicking the mouse advances you through the bullet charts. If you use videodiscs of images, there is similar software that allows you to prepare an image list prior to a presentation.

Multimedia in the Lab

So far, I have talked exclusively about using multimedia works in the lecture hall as a presentation tool. Multimedia can also be used in the computer lab where students can interact with carefully prepared works on their own. The advantage of such interaction is that it can proceed at the student’s pace without intervention from the instructor. In theory, labs can usefully supplement lectures, seminars, and office hours.

Most useful lab multimedia works tend to be interactive and carefully designed so that the student can use the system without extensive training. There is a growing number of finished works that use text, graphics, sound, and video to provide interactive information. For example, the Voyager Company has prepared a set of HyperCard stacks that work with the Van Gogh Revisited videodisc. The work is an introduction to the work, life, and art of Vincent Van Gogh. You can listen to Leonard Nimoy discussing Van Gogh’s death in the room where he died, or search a database of his works and see all the works from a certain period. The work allows a student to browse the information in a number of different ways; there is no fixed script as to what one has to look at. For other examples, see Hua Ji’s article, “Multimedia Works in the UTCS Library,” in this issue. For language teachers, there are works such as the KanjiCard stacks being developed here by the East Asian department that use sound and animation to teach the pronunciation and stroke order of selected Japanese characters. Here are some basic issues to consider when using multimedia in the computer lab:

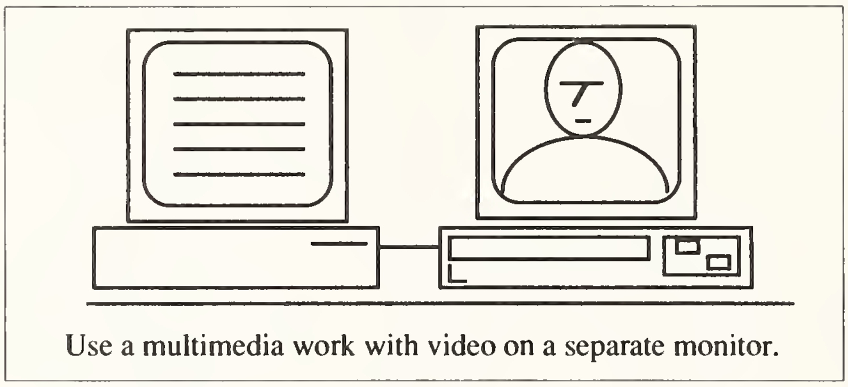


Figure 5: Multimedia station.

1. The first issue to consider is the setup of the teaching lab itself. This is not the place to discuss issues around administering a lab – suffice it to say that you have to consider where the students will interact with any multimedia works prepared for them.
2. Multimedia labs have special needs over and above computer labs. If you are going to use video or sound, you need special hardware that does not come standard with most computers. For example, to do interactive video, you need a videodisc player and separate monitor for each student station. This adds significantly to the cost of a lab.
3. Given an appropriately equipped lab, you need to consider whether you want to use existing multimedia works or author your own. The list of existing works is a short one; in many areas, there is no choice but to create your own. Even if there are works in your field, you may find they need adapting. UTCS and the Media Centre have catalogues of multimedia works and videodiscs that can be used. It is a good idea to come to us and get a sense of what exists before embarking on your own projects.
4. If you decide to adapt an existing work or author one from scratch, you need to consider the authoring tools and services at your disposal. The choice of authoring tools will depend partly on what sort of work you are doing and what equipment you have at your disposal. In our experience, the creation of multimedia works is a long and expensive operation. Because of the expense of authoring, it is often better to select the authoring tools appropriate to the project and build a lab around what you can produce with such tools. The cost of authoring can exceed the cost of a small lab. For this reason, it is not always the best idea to get the cheapest hardware if there is no convenient authoring system for such hardware. (See the accompanying article on authoring systems.)
5. Design is important for standalone multimedia works. If the student is supposed to use such works without assistance, the works have to be designed so that they are easy-to-use. This is rarely as easy as it sounds. You should be prepared to test the work on selected students before releasing it. The educational design of the work is also going to be crucial to the educational success of the work. Good design depends on you, not the hardware or software. The computer does not guarantee quality.

Where Should You Go From Here?

If you are interested in using multimedia in classroom presentations, you can contact us for more information. We are planning a presentation seminar this fall, coming to a department near you. This seminar will demonstrate some of the approaches mentioned above. If your department or faculty is interested in hosting one of these seminars, talk to us.

If you are interested in using multimedia in the lab, you should also contact us. We can guide you through the maze of terminology and services. We recommend that you first get a sense of what exists both in your own field and in others. By looking at completed works, even those from another discipline, you can get a sense of what can be done and the limitations of the medium. UTCS has a small library of exemplary works that you can preview. We also have catalogues of other works that can be ordered.

You next need to consider the institutional support for such a project. Getting and supporting a lab is an issue for your department and central organizations. We can put you in contact with the appropriate people.

If you decide to create your own multimedia work, we can help you with the programming and the design. We have a HyperCard course and now support other authoring environments like Linkway. We have related services of interest for users authoring multimedia works; we have scanners for importing images, sound digitizers for recording sound, and design templates.

Even if you do not plan to author something, you should feel free to come down and browse some of these new multimedia works – multimedia is a fascinating "new" medium. Give me a call at 978-4548.

Multimedia Works in the UTCS Library

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UTCS has acquired several commercially-produced multimedia products as exemplary works, to act as models and to show people here in Toronto some ways to make use of multimedia. All the packages that we purchased include a video component packaged on a videodisc. You can use these packages directly as they come, with both the video and software the vendor has supplied, or you can use the videodisc as an image source for material you put together yourself. If you choose the second route, you can select from the useful images, video clips, or textual information found in a finished project, arrange your selections in a new sequence, and add in your own graphics and notes.

A number of companies and organizations have developed and marketed interactive videodiscs. The contents of these programs cover a wide range from topics of humanities to those of science and engineering. The price of these projects vary greatly, from about US$50 to US$4,000, depending upon each project's production cost and the marketing policy of its manufacturer. We purchased only inexpensive material as models, and tried to cover various disciplines, from the fine arts and humanities to the sciences and medicine. You are welcome to make an appointment with us to look at our small collection.

Following, I will briefly describe five representative projects available in our library. Three of them work with HyperCard on the Macintosh: *Instant Replay of History: Martin Luther King Jr.,* made by ABC News; *Salamandre, Châteaux of the Loire,* and *Van Gogh Revisited,* both distributed by the Voyager Company. The other two projects are made for use with IBM's InfoWindows Presentation System (IWPS): *The Psychiatric Interview: Module II* by Health Sciences Consortium; and *Exploring Chemistry* by Falcon Software Inc. Since there can be so many ways to use the material, I can only give a general description of these projects' contents. Note, however, that the original colour images taken from the videodisc can be shown only in black and white for *ComputerNews.* Much as the colour effect is diminished, we hope, nonetheless, that they will suggest the type of material the discs contain.

Instant Replay of History: Martin Luther King Jr.

ABC News has created an interactive program about Martin Luther King, a collection of visual, audio, and textual documents about King's life and the cause he represented. To use this package, you need a videodisc player, with screen attached, and a Macintosh computer. The computer controls the presentation and the student sees text and some images on the computer screen. However, the video images go only to the separate video screen directly connected to the videodisc player. The narration that comes with the video component is offered in two languages, English and Spanish. With the purpose of helping teachers design their own courses, ABC offers "Video Lesson Plans," which contains suggestions for outlines and questionnaires that teachers can use. The Lesson Plans try to organize such subjects as the legacy of Dr. King, Dr. King's philosophy of nonviolence, racism, and so on. Although this material is principally aimed at the high school student, parts of it might be useful for teaching undergraduate topics in modern American history and other related subjects.

Videodisc Contents: The two-sided videodisc contains about 45,000 sequenced and still images of King and the Civil Rights movement, which are accompanied by background information, comments, maps, and other textual materials. The material can be browsed using the presentation HyperCard stack ABC News provides, or you can use the tools they give to assemble your own material. On the videodisc is actual news footage from events such as: King and the FBI, Montgomery bus boycott; 1956, Birmingham; 1963, the march in Washington; 1965, King's assassination in Memphis; 1968, reaction to King's death; the influences of Dr. King. In addition, ABC has included some present-day commentary by Ted Koppel, and interviews with various people to discuss King's influence on modern-day America. Also included are stills, video sequences, and biographical information about Coretta S. King, Rosa Parks, Jack Kennedy, and J. Edgar Hoover, to name a few. As an example, you can view some of King's memorable speeches, like his famous "I have a dream..." in Washington, DC. *Figure 1* shows what you see on the Macintosh screen, and *Figure 2* shows what you see on the video screen. In summary, you will find hundreds of ways to move through the visual, audio, and written materials according to your specific interests.

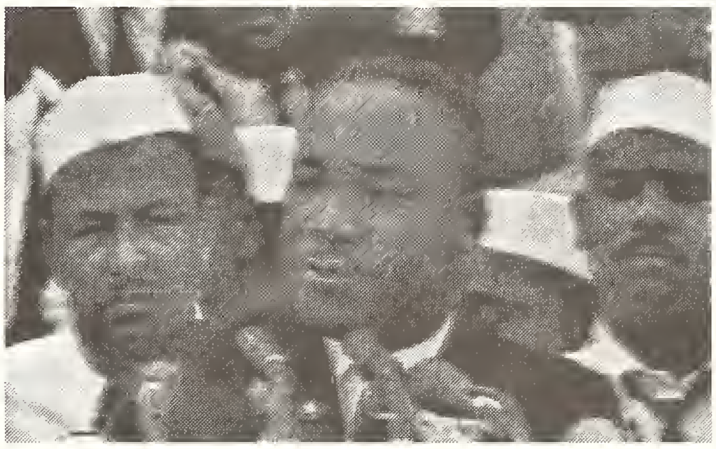
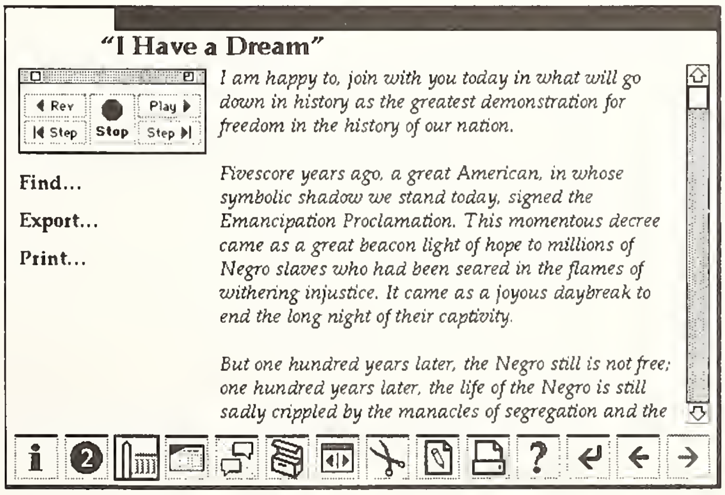


Figure 2

Making your own presentation: Through the HyperCard stack, ABC gives you control over the King presentation in at least two ways. On one hand, it gives you an organized way to view, review, and step-view the images and information in any way that suits your needs. On the other, it provides you with an effective tool, called the "Documentary Maker Authoring Tools," that allows you to select material from the King videodisc for your own presentation. A row of buttons appears on every card, enabling you to play, search, cut, and put into sequence the selected images and information notes. For example, when you locate an image or a note you need, click on the Scissor icon to cut and store it aside. Similarly, you can also use a Clip Maker button to cut a certain length of video sequence and put it aside for later use. After you feel satisfied with the visual and textual pieces you have chosen, you can use the Presentation Maker button to edit and arrange your selection into the desired sequence.

Figure 1



"I Have a Dream"

I am happy to, join with you today in what will go down in history as the greatest demonstration for freedom in the history of our nation.

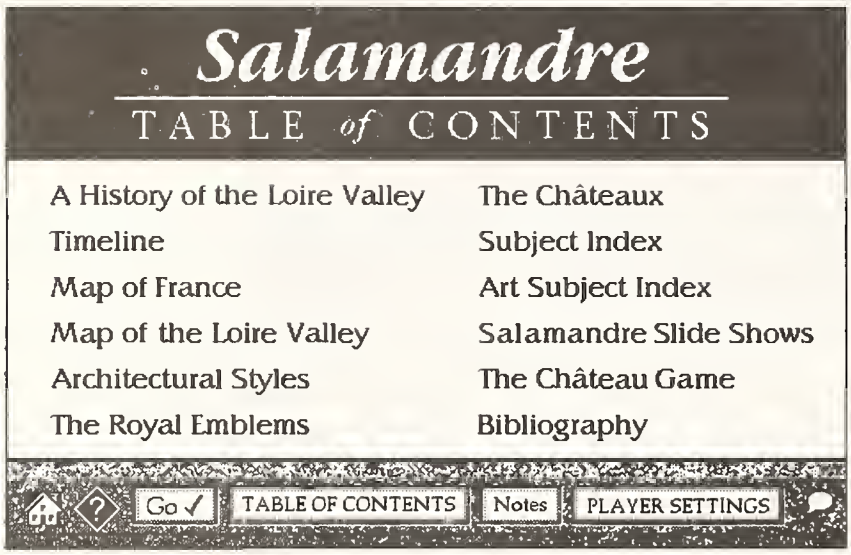
Fivescore years ago, a great American, in whose symbolic shadow we stand today, signed the Emancipation Proclamation. This momentous decree came as a great beacon light of hope to millions of Negro slaves who had been seared in the flames of withering injustice. It came as a joyous daybreak to end the long night of their captivity.

But one hundred years later, the Negro still is not free; one hundred years later, the life of the Negro is still sadly crippled by the manacles of segregation and the

You can also type in your own notes or insert your own tape images. After spending a few hours on the cutting and pasting job, you can create a personal interactive video lesson.

Salamandre, Châteaux of the Loire Videodisc

Salamandre is created by ODA/ Laser Image and is distributed by the Voyager Company. It is another of the presentations that uses two screens: one showing only images from the videodisc, and the other (on the computer) showing material from HyperCard. It collects on a one-sided videodisc the motion sequences, computer animation, written information, and about 750 photos of more than a dozen royal castles and chateaux in France, built between medieval and baroque times in the famous Loire Valley. The visual and textual documentation explores these chateaux from the historical, artistic, architectural, and geographical perspectives so that users can either provide illustrative video lessons for their students in these fields or do an effective self-study on their own. The images can be of interest to the art history and architecture disciplines. Narrated in both English and French, Salamandre can prove useful to French Language teaching courses as well.



Salamandre

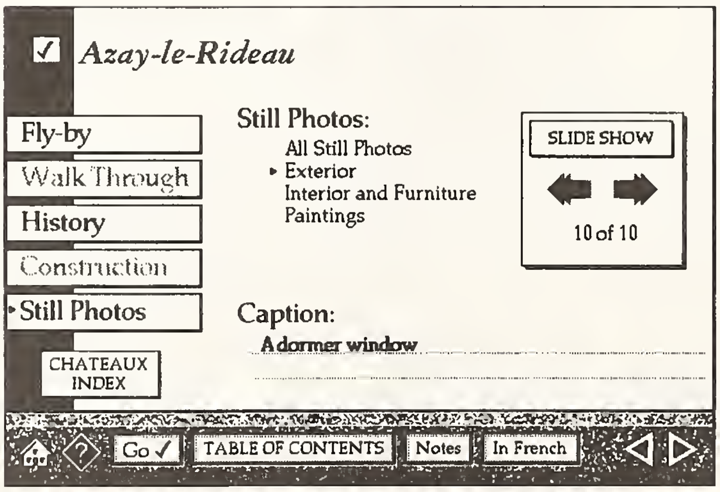
TABLE of CONTENTS

- A History of the Loire Valley
- Timeline
- Map of France
- Map of the Loire Valley
- Architectural Styles
- The Royal Emblems
- The Châteaux
- Subject Index
- Art Subject Index
- Salamandre Slide Shows
- The Château Game
- Bibliography

Figure 3

Videodisc Contents: *Figure 3* shows the main table of contents for the Salamandre disc and stack, and the names of the major chapters in the presentation. When you open the chapter of "A History of the Loire Valley," you can read through cards of historical information about the chateaux and the French royal families related to them. The important terms are printed in bold. By clicking on these terms, you will be led to pictures of people, artistic works, architectural styles, or other illustrations. When you go to the Timeline chapter, you can view the chateaux developed along a chart of time sequence. You will see the small icons of chateaux spread along the timeline, which will also lead you to illustrative pictures as you click on them. Similarly for the Map chapters, you can open the castle icons on the maps to look at each individual chateau.

For your specific needs, "The Architectural Style Index" listed in the Main Index is another useful way to study the French chateaux. The Index lists the four time periods discussed in the program: the Medieval Fort, the Gothic Period, the Renaissance Chateau, and the Baroque Influence. Here you can read the definition of each architectural style, look at the chateaux that represent the style, or view the development of a certain chateau through different historical periods. The "Chateaux Index" is also an illustrative way of viewing, offering five ways to study each chateau: The "Fly-by" offers some aerial footage of the chateau taken from a helicopter; "Walk Through" provides



✓ Azay-le-Rideau

Still Photos:
All Still Photos
▸ Exterior
Interior and Furniture
Paintings

Caption:
A dormer window

Figure 4

a motion sequence that explores the exterior and interior of a chateau with a narration of the historical significance of architectural details; "History" takes you to a card that discusses the history of the chateau; "Still Photos" present a sequence of still photos of the chateau and a sub-index lets you look at a specific section of the still photos. *Figure 4* shows the Macintosh screen and *Figure 5* shows the video screen while the user looks at the striking dormer windows from the Azay-le-Rideau chateau; finally, the "Construction" gives an unique computer-animated motion sequence that shows the construction and modification of the chateau through centuries. In each of the five areas, you can use a Motion Controller to control the speed and direction of the play.

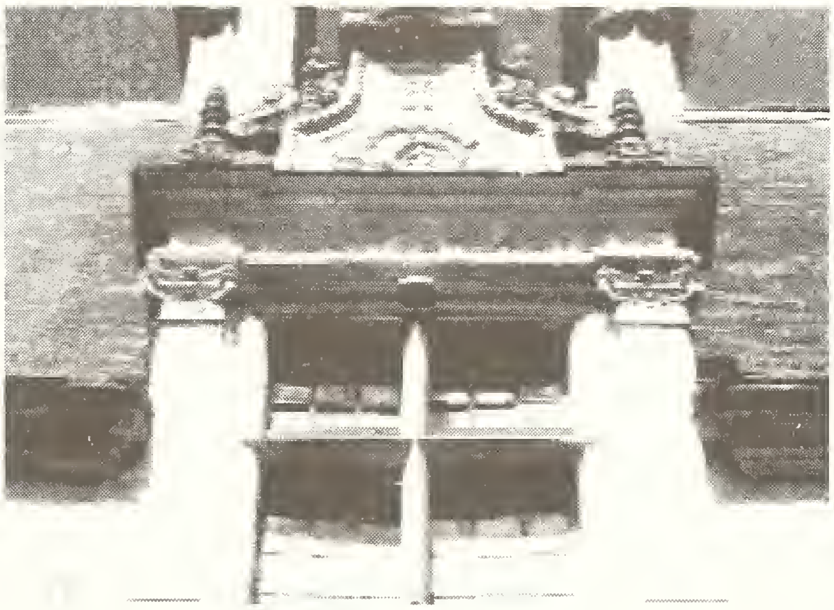


Figure 5

Making your own presentation: Three key buttons allow you to edit the program or compose your own video lessons. The first button is a checkmark surrounded by a square frame on the upper left corner of each frame, which lets you cut and save aside the picture on the current screen. After you have cut enough clips for your own use, you can click on the button "Go" to view the list of cuts you have made of still frames and motion sequences. You can then further edit and arrange the sequence of your cuts. The third button is marked as "Notes," which allows you to enter your own notes and combine them with the still and motion images in your sequences.

Figure 6

Van Gogh Revisited

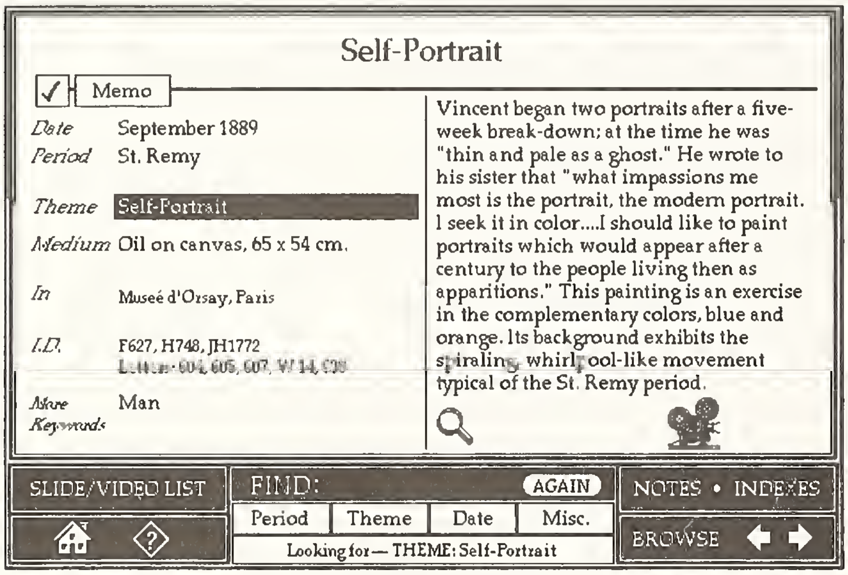
The Van Gogh Revisited presentation is also distributed by the Voyager Company, although the disc was made by Philips and Du Pont Optical. The videodisc is a collection of written letters, artistic works, their influences, and other information about the life of artist Vincent Van Gogh. The narration, given by film actor Leonard Nimoy, and the video and audio replay of Van Gogh's life make the program a very impressive presentation of the great artist's life and brilliant achievements.

Videodisc Contents: The program is divided into two major sections: the Index and the Catalog. The Index offers different ways to access the motion sequences and still-frames on the videodisc, while the Catalog provides a page of information on each painting and drawing shown on the videodisc.

The Index provides access to seven main chapters: 1) "Periods" is a database of Van Gogh's life and work over five time periods; 2) "Themes" classifies his works by different themes; 3) "Topics" is an indexed collection of the motion clips on selected topics; 4) "Timeline" provides an illustrated timeline of Vincent's life; 5) "Techniques" describes his artistic techniques; 6) "Influences" explains the mutual influences between Van Gogh and other important artists; and 7) "Keywords" is an index of searchable keywords for the program. Inside each chapter, you can use various icon or textual buttons to go to different sections and view them in the way you prefer. For example, inside the chapter of "Period," a row of buttons marked by the words DUTCH, PARIS, ARLES, ST. REMY, and AUVERS lists the five periods of Van Gogh's life and work. Clicking on a period name to open that section, you can use another set of buttons, an icon of a motion projector, a paint brush, or a reference folder to choose different ways of viewing. The "movie projector" button will start a critical commentary of Van Gogh's life by Leonard Nimoy, an excerpt from his letters, or his paintings and their artistic significances in that period. While viewing the motion and still pictures, you can use the Motion Controller Panel to play, step, or play at fast speed, forward or in reverse, through the overview sequence. You can switch audio channels by clicking on certain buttons. The "paint brush" button will open a list of paintings and drawings by title and date. We've included here a sample from this part of the presentation: one of his famous late self-portraits. *Figure 6* shows the video image on the monitor – the original image is in full colour, but is shown in black and white for *ComputerNews*. *Figure 7* shows the accompanying display on the computer screen. The "reference material" button presents text that describes the influences on Van Gogh's painting. *Figure 8* is an example. With each item in the text, there is a corresponding video image, so you can see, for example, a church as it looks today, and as Van Gogh painted it. It is also possible to select paintings by topic, period, style, or to view works by other artists that influenced Van Gogh's work.

Making your own presentation: Four feature buttons in the Catalog Section of the program, Checkmark, Memo, Slide/Video Show, and Notes, allow you to create your own video lesson. You can click on the Checkmark button to add the still or motion frames you are viewing onto the Slide/Video List for later reference. You can also click the Memo button to bring up a "memo" pad on which you can write short notes about the work you are viewing. When you have made enough cuts on your list, you can click on the Slide/Video List at the bottom of a card to display a list of your selections. You can edit, save, print your list or choose to view pictures under the title in the list. The Notes button allows you to write your own notes and combine text and image access.

Figure 7



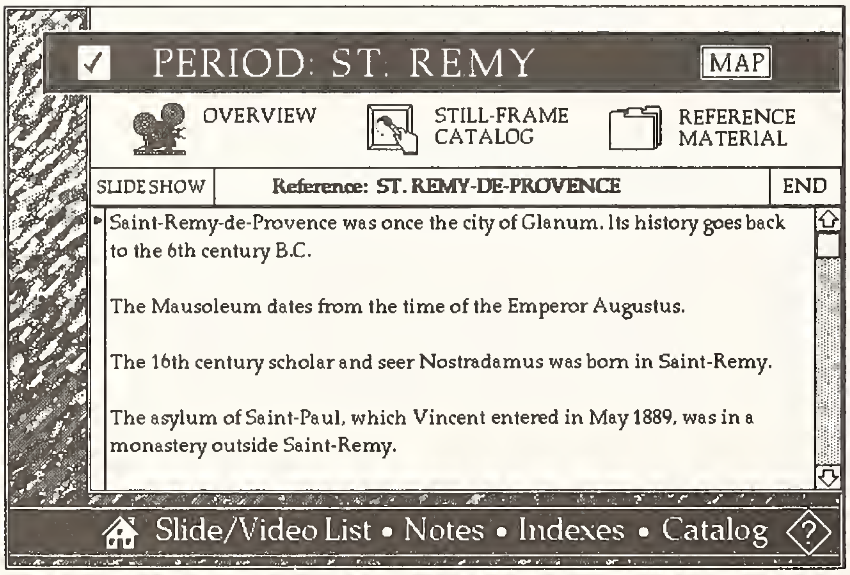
Self-Portrait

Date September 1889
Period St. Remy
Theme Self-Portrait
Medium Oil on canvas, 65 x 54 cm.
In Museé d'Orsay, Paris
I.D. F627, H748, JH1772
Letters: 604, 605, 607, W 14, [illegible]
More Keywords Man

Vincent began two portraits after a five-week break-down; at the time he was "thin and pale as a ghost." He wrote to his sister that "what impassions me most is the portrait, the modern portrait. I seek it in color....I should like to paint portraits which would appear after a century to the people living then as apparitions." This painting is an exercise in the complementary colors, blue and orange. Its background exhibits the spiraling, whirlpool-like movement typical of the St. Remy period.

Looking for — THEME: Self-Portrait

Figure 8



PERIOD: ST. REMY

Reference: ST. REMY-DE-PROVENCE

Saint-Remy-de-Provence was once the city of Glanum. Its history goes back to the 6th century B.C.

The Mausoleum dates from the time of the Emperor Augustus.

The 16th century scholar and seer Nostradamus was born in Saint-Remy.

The asylum of Saint-Paul, which Vincent entered in May 1889, was in a monastery outside Saint-Remy.

Exploring Chemistry

This interactive product on general chemistry, created by Loretta Jones and Stanley Smith of the University of Illinois, uses the InfoWindows Presentation System (IWPS) from IBM, and won the 1989 Ncriptal Award for the Best Chemistry Software (for university level material) from Educom. It is distributed as three separate packages (we purchased only one of them), each of which combines, on a one-sided videodisc, a series of motion and still pictures with computer instructions and realistic laboratory experiments. The computer-based instruction is effectively enhanced by video images of actual experiments and provides a powerful teaching tool for the teachers of introductory chemistry and related areas.

Software Control: A novel feature of the IBM's IWPS is that much of it is controlled by a "touch screen." Both the video and the computer generated materials appear on the same screen. The screen is touch sensitive, and the student interacts with the program by touching the screen, thereby indicating the object on the screen he/she wants. The area can show material from the videodisc, computer generated text, or simple graphics.

Videodisc Contents: The interactive video lessons cover three major lessons: Gases and Air Analysis, Rates and Equilibrium, and Chemical Reactions and Solubilities. Take the lesson on Rates, for example: in one part of this lesson, students are first introduced to the concept of chemical reaction rates by reading some instruction on the screen and viewing an actual experiment that shows the combustion of cotton soaked in liquid oxygen as an example of a fast chemical reaction. Then, they are told that the rate of reaction is in part controlled by the size of the surface area that can react. Next, they are shown a video sequence that compares the oxidation rates of iron in a particular chemical. Two iron samples are used: steel wool and a nail. At the end of the oxidation video, they are asked to select which oxidation occurred more quickly by touching the screen (see *Figure 9*). If they choose the right answer, they can carry on with the lesson. If they touch the wrong answer, they will be told why and then taken through the instruction and experiment again. Sometimes the tests will ask students to enter the correct values or formula after observing an experiment on the video.

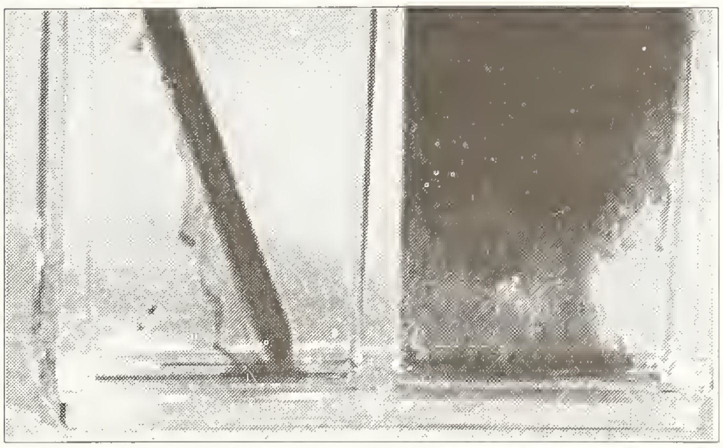

`TOUCH the one which oxidized more rapidly.`

Figure 9

Psychiatric Interview Series

This material, created by Lee Bairnsfather from the Louisiana State University Medical Center, is also made for the IBM InfoWindow touch screen using the IWPS, and is distributed by the Health Sciences Consortium. Kindly loaned to us by Dr. L. Spero of the Faculty of Medicine at the University of Toronto, the videodisc is intended to help medical students learn the skills of conducting successful psychiatric interviews with prospective patients. The program is divided into the various steps of conducting a normal psychiatric interview, with each step exemplified by a motion sequence of an actual interview by an experienced psychiatric doctor. *Figure 10* shows a scene from the interview.

In a fashion that is very similar to the Chemistry interactive program described above, students are provided with a touch screen to view the examples and answer the test questions. If the student touches the wrong answer, he/she is told of his/her error and then taken through the example interview again. Only after choosing the right answer will the lesson continue.

I hope this quick survey will help you understand the range of material that can be effectively taught with video images. It is virtually impossible to give you the real flavour of any of these presentations in an article such as this—the material must be used to be properly appreciated. Also, we acquired a couple of other packages which are not discussed here: the University of Delaware's "Videodisc Music Series" (Fred T. Hofstetter, Principal Investigator) and "Doing Chemistry," from the American Chemical Society. We also have access to a few other discs that we do not own, but can borrow from the owner on request, such as VideoDiscovery's "Biological Science" disc.

If you would like to try out any of them for yourself, please call me at 978-6050.

Figure 10

HyperCard 2.0: New and Improved

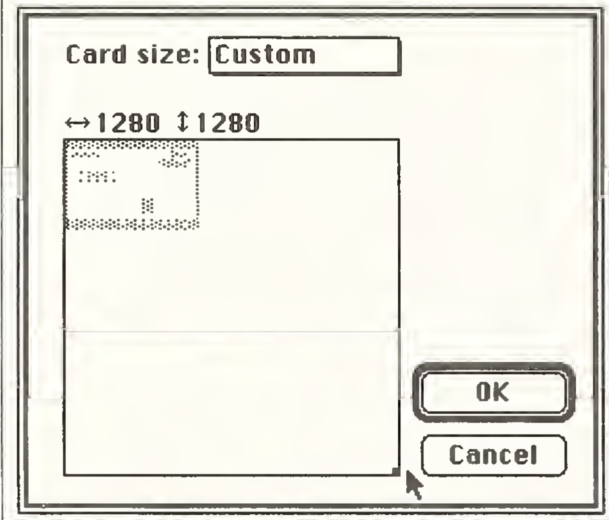
Paul C. Forage

HyperCard 2.0, to be released this fall, is a significant rewrite of Apple's flagship hypermedia software that provides educators and researchers with a powerful tool for creating multimedia-oriented research tools, presentations, and courseware. The Apple Research Partnership Programme at UTCS has been working with early versions of HyperCard 2.0 for several months, courtesy of Apple Canada. What follows is a quick survey of our initial observations. In brief, HyperCard 2.0 has more than 40 important new features, including variable card size ranging from 64x64 to 1280x1280 pixels, multiple windows, and important renovations to HyperCard's external command (XCMD) integration. While this release may not have all the items that have been on developer's wish lists, the new Extended XCMD interface now allows custom commands to create and manage their own windows that are capable of receiving mouse events.

One of the most wanted items has been true hypertext capability – the interactive linking of key words in text with related information. Although HyperCard popularized the concept of hypermedia and navigable text when it was first released three years ago, 1.x versions required awkward workarounds to approximate true hypertext capability. Version 2.0 now includes new commands like **clickLine, clickText, and clickWord,** that make text in fields easily manipulable by HyperTalk scripts. At the user-level, text styles and fonts can now be mixed within a single text field, allowing developers a simple way to indicate hot text items.

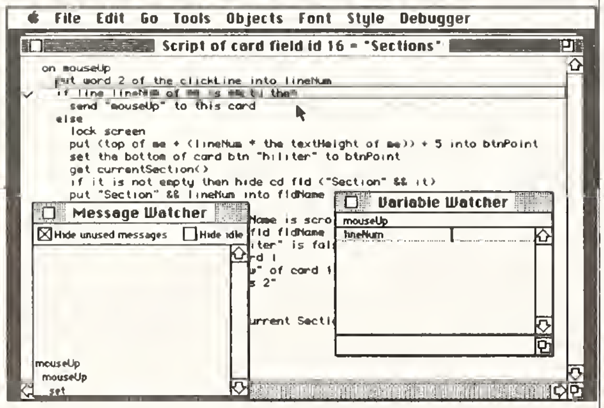
Other new HyperTalk commands allow menus to be fully editable, presenting even greater control over the user interface. In addition, an added feature to the familiar HyperCard interface is creation and editing of custom "palettes" of tools or controls that can float over a card in a small miniwindow. One example of a palette could be a set of videodisk controllers that float over the card level, which could then be devoted entirely to imported images.

The new Script Editor and Debugger is actually a completely new internal XCMD that gives to HyperTalk script editing almost all the functionality of a full-fledged programming environment (see *Figure 2*). A script can now be stepped through, checkpoints can be marked, and messages and variables can be monitored using the new message and variable watchers, eliminating the need to


Card size: Custom

↔1280 ↕1280

Figure 1: Card Size. The card size of any stack can be extended to 1280 x 1280 pixels, one size per stack.



```
on mouseUp
  put word 2 of the clickLine into lineNum
  if line lineNum of me is empty then
    send "mouseUp" to this card
  else
    lock screen
    put (top of me + (lineNum * the textHeight of me)) + 5 into btnPoint
    set the bottom of card btn "hiliter" to btnPoint
    get currentSection()
    if it is not empty then hide cd fld ("Section" && it)
    put "Section" && lineNum into fldName
```

☒ Hide unused messages ☐ Hide idle

```
mouseUp
  mouseUp
   set
```

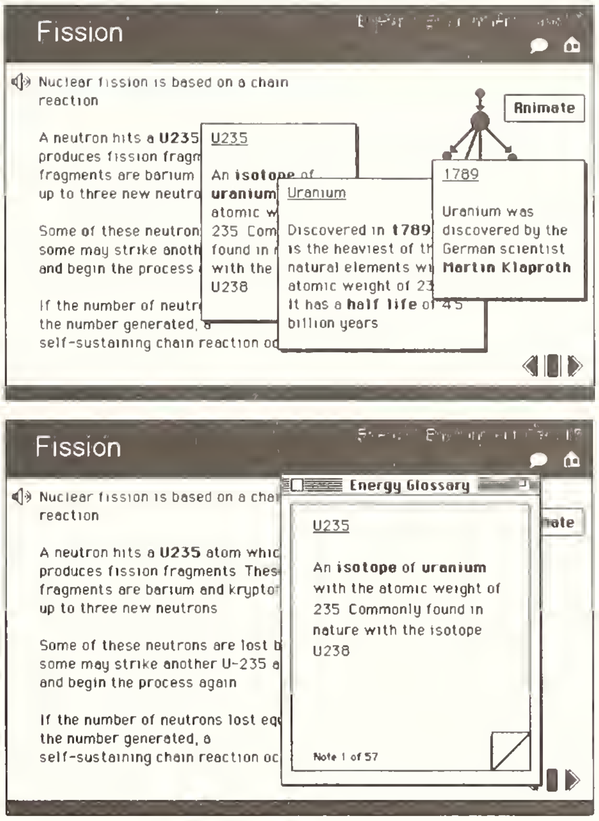
```
mouseUp
lineNum
```

Figure 2: Debugging Environment. Debugging in HyperCard has been completely revised and includes a number of features, including the Message and Variable Watchers, that assist the creation of advanced HyperTalk scripts.

insert "beeps" and "puts" into complex scripts while debugging. To increase performance, scripts are now automatically compiled when first executed and stored in RAM while HyperCard is running.

Apple's declared design objectives for HyperCard are to keep it "fast, simple, and well-integrated." This has resulted in some noticeable tradeoffs if HyperCard 2.0 is compared to other hypermedia platforms. Colour capabilities, for example, remain limited as the result of a decision to sacrifice integrated colour capability for the sake of speed. Using the new "internal" Picture XCMD, the new version can display 32-bit colour images, but other elements of the user interface, including backgrounds and text, cannot be easily colourized. MacDraw-style graphical objects still cannot be created nor can they be addressed by HyperTalk. But Apple hopes to compensate by encouraging third-party developers to create toolkit stacks that provide this functionality.

Beyond release 2.0, Apple's future plans for HyperCard include moving some of its features over to the Macintosh operating system (OS). One of these may be the fast bit-map algorithm in HyperCard. The old idea of either installing resources into the Home stack or a standalone stack will be less important as resources can now be shared among stacks, and eventually the Mac OS itself, using the new **use** command. Altogether, HyperCard 2.0 adds exciting new capabilities while enhancing the speed, ease of use, and utility of its predecessors.



Nuclear fission is based on a chain reaction

A neutron hits a **U235** produces fission fragm fragments are barium up to three new neutro

Some of these neutron some may strike anoth and begin the process

If the number of neutr the number generated, a self-sustaining chain reaction oc

U235

An **isotope** of **uranium** atomic w 235 Com found in with the U238

Uranium

Discovered in **1789** is the heaviest of th natural elements wi atomic weight of 23 It has a **half life** of 4.5 billion years

1789

Uranium was discovered by the German scientist **Martin Klaproth**

Nuclear fission is based on a chai reaction

A neutron hits a **U235** atom whic produces fission fragments These fragments are barium and krypto up to three new neutrons

Some of these neutrons are lost b some may strike another U-235 a and begin the process again

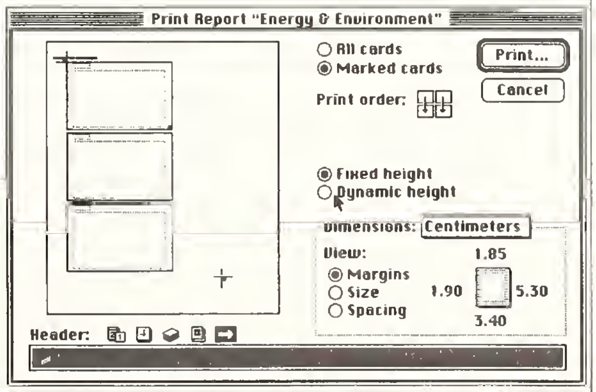
If the number of neutrons lost eq the number generated, a self-sustaining chain reaction oc

U235

An **isotope of uranium** with the atomic weight of 235 Commonly found in nature with the isotope U238

Note 1 of 57

Figures 3a and 3b: True HyperText. Text styles can now be varied within a single text field and can be made active using a set of new commands. One way these new commands can be used is to create nested glossaries. Another technique is to create companion glossary stacks that utilize version 2.0's ability to display a number of stacks in multiple windows.



○ All cards
● Marked cards

Print order:

● Fixed height
○ Dynamic height

Dimensions: Centimeters

View:
● Margins
○ Size
○ Spacing

1.85
1.90
5.30
3.40

Header:

Figure 4: Improved Reporting. The information contained in HyperCard 2.0 stacks can be retrieved by printing user-definable reports. With a new set of three dialogs, specific fields, their placement, and text styles can now be specified.

Multimedia Authoring

Geoffrey Rockwell
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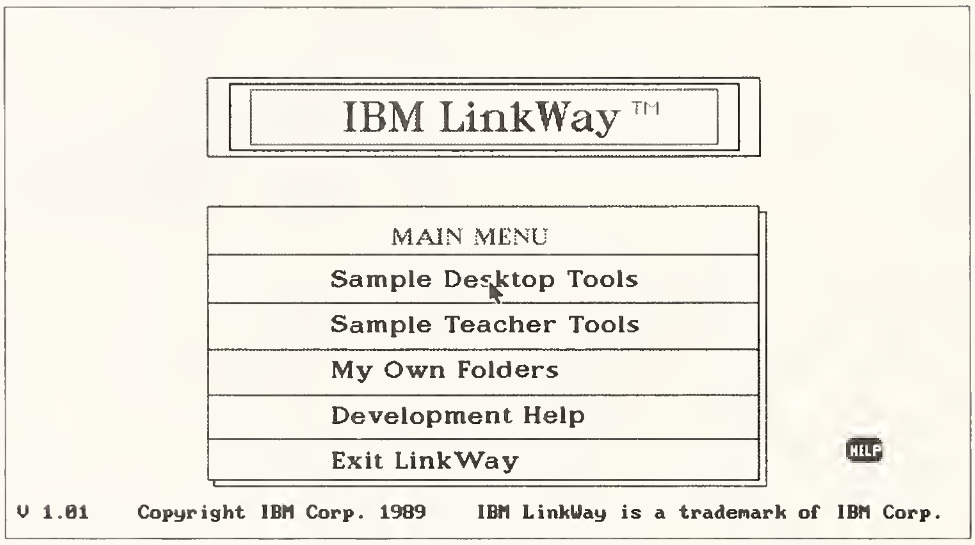
To create your own multimedia work you need, first of all, to choose an authoring system: the glue that will hold all the information in different media together. The authoring system is the environment where you are going to mix and order your images, video sequences, sound, and text. Most authoring systems are designed to insulate you from programming. In a programming language you can do almost anything, but at great expense and with great difficulty; an authoring system, on the other hand, should allow you to quickly and easily put multimedia works together with a minimum of programming.

When considering an authoring environment you should first consider how easy it is to use. How hard is it to learn? Who is there to support you when you run into problems? If the environment is too difficult to use, you won't do much with it. If the system takes too long to do anything, you will also find your project bogged down.

Secondly, you should consider the media you want to use. Some systems are better suited for certain media than others. If you want live video on the screen with your computer graphics, your options will be limited to those packages that support onscreen video. Often you have to explore the extensions available for various authoring systems. If you want sound on an IBM PC, you will have to get an authoring system which works with an available sound board.

A third consideration is the method with which to import the desired media into your multimedia work. Your authoring system may support colour images, but getting an illustration into the computer is another question. You have to consider copyright. Then you have to find a scanner attached to an appropriate computer. UTCS has a number of scanners and other services to assist you getting sound and images into the computer.

Most popular authoring systems today imitate HyperCard. The success of HyperCard and its ease of use have made it a standard. (See the article on HyperCard 2.0 in this issue.) SuperCard on the Macintosh, Linkway, HyperPad, and ToolBook on the IBM PC are all similar to HyperCard in their design philosophy. In all these products, the designer divides his work into cards which can contain text and images. The cards are then linked with buttons and scripts. The user wanders around the web of cards following the links the designer makes available. Sound and video sequences are attached to buttons so that the user can hear and see things when they click on the buttons. HyperCard and its imitators save you the work of having to create cards and buttons. Instead, you can concentrate on what text and images should go on the cards and how the cards should be linked.



V 1.01 Copyright IBM Corp. 1989 IBM LinkWay is a trademark of IBM Corp.

Figure shows Linkway's opening menu screen.

Clearly, choosing the correct authoring environment is an important aspect of creating a multimedia work. In future issues of *ComputerNews,* we will review authoring systems and hardware that we support. However, if you are interested in creating a multimedia work, come talk to us. We can advise you as to the variety and benefits of various authoring tools. We can also put you in touch with projects already using these tools. Furthermore, we can help you choose the right tool for the type of work you intend to do. Above all, we love to chat about the possibilities.

Multimedia and Video

Terry Jones
tj@gpu.utcs.utoronto.ca

Video is a very dynamic medium for presentations. It can be captivating, informative, and persuasive. When using video, you have to choose not only the video content, but you also need to choose what type of video you want or need to use. You must also consider how you are going to present the video information to the viewer. How you need to access the video during your presentation may also dictate what type of video to use.

In the broadest sense, there are two main types of video: computer video and television video. Unfortunately, there are actually many different forms of each of these types.

Television video is very common and may at first appear as "standard." In North America, we normally do use one standard, called NTSC, but there are other standards used on other continents. PAL and SECAM are two other common standards used across the "big pond."

There is a variety of different sources of NTSC-type video. By far the most common source is broadcast video, which we see on almost a daily basis. Video Cassette Recorders (VCRs), videodisc players, Digital Video Interactive (DVI), live video cameras, and still video cameras are other sources of NTSC video that all have distinct advantages and disadvantages, depending on your presentation.

VCRs are essentially broadcast video under your control. You can start and stop the video as required. Most VCRs offer remote control using hand-held controllers, and some offer computer interfaces allowing you to co-ordinate the video presentation using the computer. VCRs are also very inexpensive. The main disadvantage of VCRs is that the tape is sequential in nature, thus making it difficult to access any particular portion of the sequence directly. Searching forward and backward through the tape is very slow on all VCRs, and getting to exactly the correct spot on the tape can be difficult on all but the most expensive VCRs. VCRs are useable in only a few multimedia applications.

Videodisc is a video technology that overcomes many of the limitations of VCR technology. A videodisc looks like a large compact disc (CD) (see *Figure 2*). As the name implies, the player uses a laser beam to detect the information on the disc. The disc also contains audio information and can contain "program" information. The video contained on a videodisc may be one continuous sequence, such as a movie; a collection of sequences, such as different scenarios for a particular situation; or a large number (54,000) of individual still frames. Videodiscs are random access devices, meaning that you can easily get to any particular video image or sequence quickly (under one second, usually). They can be controlled in a number of different ways, including computer control, bar code reader, programmed information on the disc, or by using a hand-held remote control. Using computer control, you can have a program running on your computer select the appropriate images or sequences to be displayed or played. Bar code readers allow you to read through a booklet provided with the videodisc; barcodes mixed with the text in the booklet allow you to select the video sequence that relates to the text at that point. When using the programmed information contained on the disc, the player can stop and pause the disc at appropriate times, as directed by

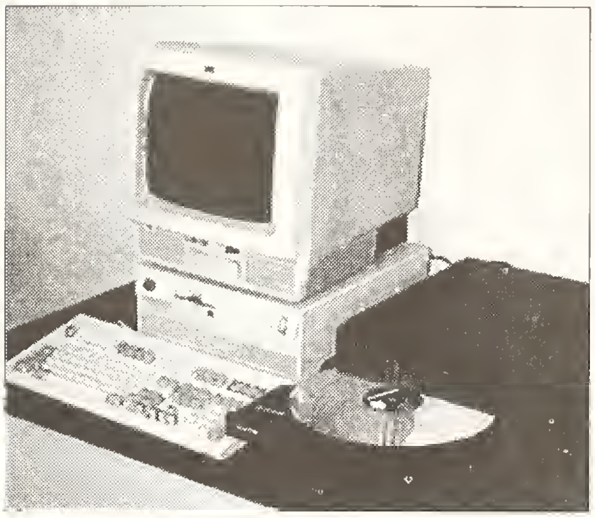


Figure 1: A typical InfoWindows workstation. On the left an IBM PS/2 computer with the touchscreen display. The touchscreen display can combine video sources from the Videodisc player (on the right) with computer generated material. The workstation user interacts with the presentation by touching the screen.

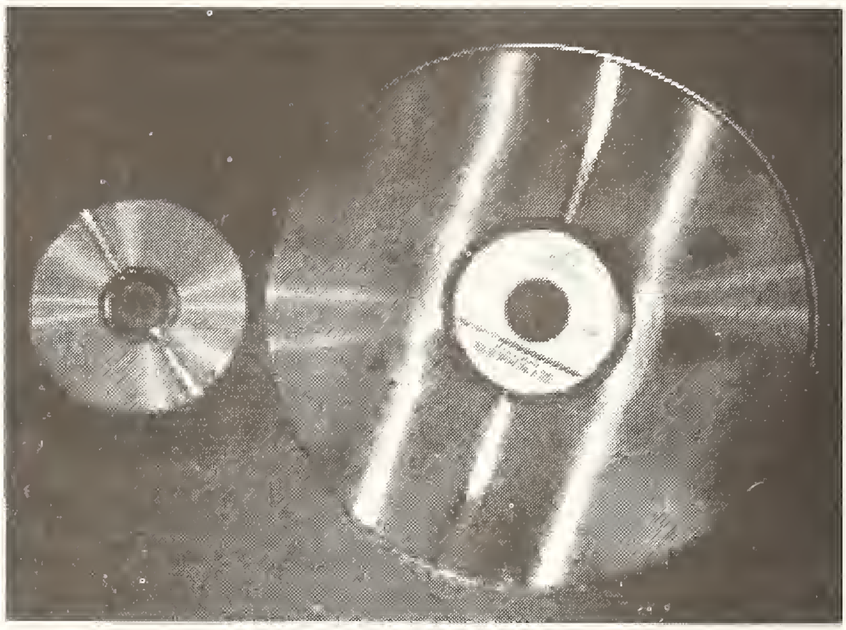
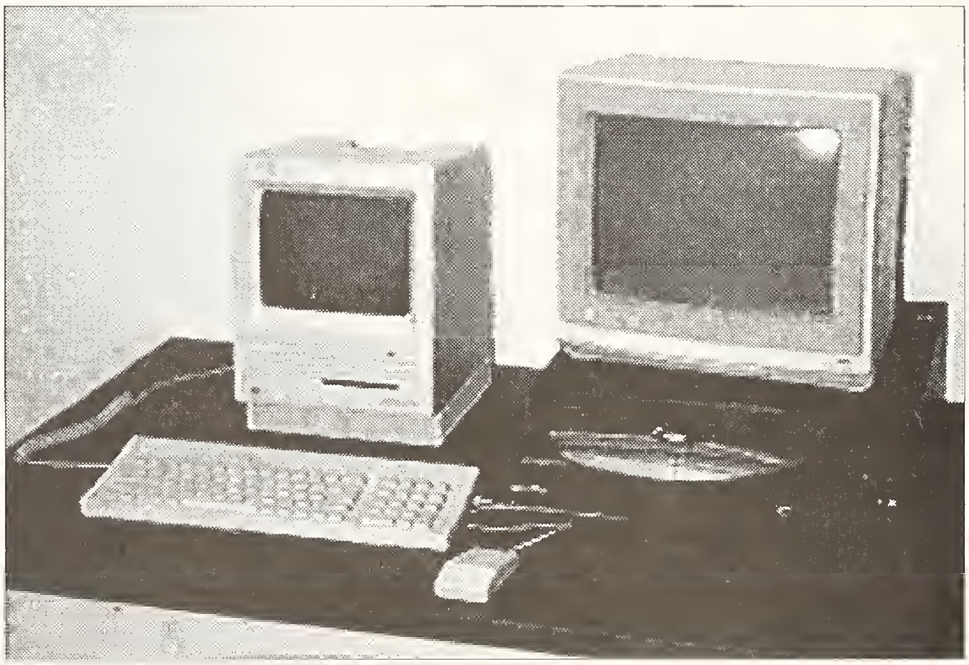


Figure 2: Two examples of optical storage technology. On the left a Compact Disc (CD) (4.75 inch radius), on the right the larger Videodisc (12 inch radius).

this program information. When you insert the disc into the player, it might automatically play a video sequence, then pause with instructions displayed for the viewer. A hand-held remote control can be used alone, or in conjunction with information programmed on the disc, to go on to the next sequence or still frame. The hand-held remote control generally gives you functions similar to those found on VCR remote controls, plus the ability to go directly to any particular spot on the disc quickly. The major disadvantage of videodisc technology is that the discs are difficult to make. They cannot be erased and recorded like video tapes. They have to be manufactured. This means they are not changed easily. The manufacturing costs are relatively high, making it impractical to make just one disc. Rapid random access to large quantities of audio and video information at moderate cost makes the videodisc technology the most common choice for today's multimedia applications. UTCS has a

Figure 3: A typical multimedia workstation for the Macintosh. The Macintosh (on the left) runs software that selects video material that is played on the Videodisc player and displayed on the video monitor on the right. The user interacts with the computer on its screen, and views any video material on the separate video monitor. Technology that combines the video and computer material on a single screen (similar to the InfoWindows workstation) is available.



Pioneer LD-V8000 computer controlled videodisc player.

DVI is a new technology that takes video information, turns it into computer data, and stores it on computer disk drives. This information can then be played back from the computer disk as a video sequence or a still video image. The advantages of DVI include virtually all of the advantages of videodisc technology, plus the ability to change the information more easily. A disc of video information can be duplicated as easily as you copy a computer file. The drawback of DVI is the equipment costs. As computer information, video is huge. Very large hard disks, Write Once Read Many (WORM) discs, or Compact Disc Read Only Memory (CD ROM) discs are required to store this much information. The computer requires special adapter boards to turn this computer data back into video images. Getting the video information into computer form can be expensive. The lower-end equipment will capture still frames and full-motion video, but not at the best quality. Expensive video tape recorders and DVI equipment are required for the best quality. You might be able to make a prototype of your application, but for a final version you would probably want to create a master tape and have it professionally converted into computer form. DVI is a new technology, still in development, so we can expect to see considerable change in this area as newer and faster equipment is designed to implement DVI.

Both live video cameras and still video cameras are useful in multimedia applications. Generally they are used to capture still frames or a very short sequence of frames that can then be turned into a computer image using hardware called a frame grabber or frame capture board. These images can then be used as a basis for creating an animation or as onscreen photographs. The images captured from video are not as high a quality as those that might be scanned into the computer using a colour scanner, but they are virtually instantaneous. You take a video picture of the scene of interest, then immediately capture it into the computer. UTCS has a Canon Xapshot still video camera and a Raster Ops Colourboard 364 to take still video pictures into the Macintosh.

The other side of video is computer video. Computer video has a large number of different “standards.” Commodore Amiga computers produce television video, NTSC. IBM computers produce at least five different types of video: CGA (Color Graphics Adapter), MDA (Monochrome Display Adapter; includes Hercules), EGA (Enhanced Graphics Adapter), VGA (Video Graphics Array), and 8514 (an IBM part number!). Apple Macintosh computers produce at least two different types of video, Macintosh (Plus, and SE types) and Mac II (Mac II types). None of these are directly compatible with each other; therefore, it takes different equipment to display these different video pictures. With the exception of the Amiga, all of these are incompatible with NTSC video as well.

With a multimedia combination of computer and NTSC video you can reap the advantages of both. There are many approaches to combining these two video sources.

One solution is to use two video monitors or displays. One monitor is compatible with the computer video, the other compatible with the NTSC video. This allows you to have both visible at the same time and running independently. The disadvantages include extra equipment costs for two monitors, extra complexity in setup and cabling, and most importantly, the viewer must shift his/her focus from one monitor to another. UTCS has a number of Macintosh-based multimedia applications that use this approach. A HyperCard stack controls the videodisc player using special XCMDs that issue control commands to the player through the modem port. These XCMDs support a number of different brands of videodisc players. The HyperCard stack can start and stop the player, play a segment of video, or display a still frame.

To avoid having to shift the user’s focus, a single monitor solution is preferable. Special video adapter boards that allow you to display NTSC video on your computer screen are available for computers. Some use the whole computer screen for the NTSC video with the computer graphics overlaid onto it. You can then use a technique called chromakeying to choose on the computer screen a colour that is effectively transparent, thus allowing the NTSC video to show through. This allows you to control what portion of the underlying picture is visible. Others allow you to open a window containing the NTSC picture. Depending on the adapter board, you may be able to resize the window and shrink the NTSC picture to fit (like a picture within a picture on advanced television sets!). Some adapter boards let you pan and zoom to display and resize a small portion of the NTSC picture. UTCS uses the Raster Ops Colourboard 364 for the Macintosh II. This particular board allows us to bring up the NTSC video into a window, shrink and expand the window and the picture in it, as well as zoom in on and pan portions of the picture. On an IBM PS/2, we also use an IBM InfoWindows display system that overlays the PC graphics on top of a full-screen NTSC picture, and allows you to select portions of the image to display using chromakeying (one colour is transparent, allowing the video “beneath” to show through). This system has the added feature of including a touch-sensitive screen, allowing you to control the presentation simply by touching the screen to make selections.

PowerPoint

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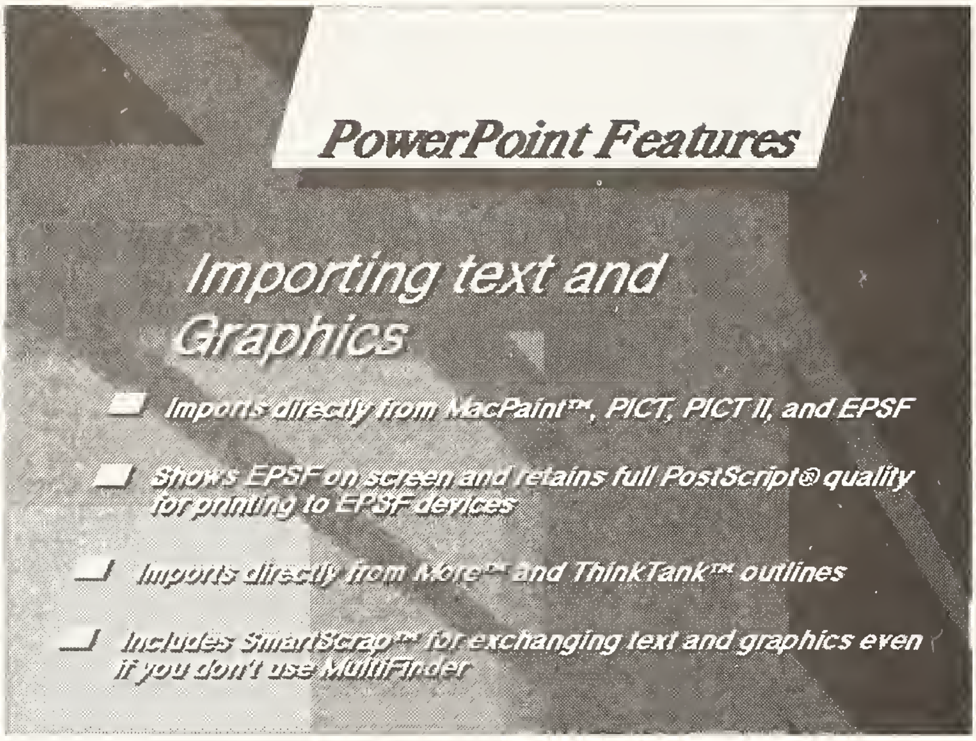
PowerPoint is desktop presentations software. Available for the Macintosh as well as for MS-DOS computers, PowerPoint is to presentations what desktop publishing software is to publications. Screen presentations, 35mm slides, overhead transparencies, laser printouts, handout notes, and speaker notes are all products of PowerPoint.

PowerPoint is the glue that brings text, photographs, charts, graphs, and drawings together. Powerful tools and the ability to import files from a wide variety of other programs make putting a presentation together easy and quick. PowerPoint also has organizational tools that allow you to arrange and rearrange your presentation as easily as you might arrange a number of photographs on a table. As you arrange and rearrange the presentation, the notes that accompany each "page" of your presentation are rearranged also.



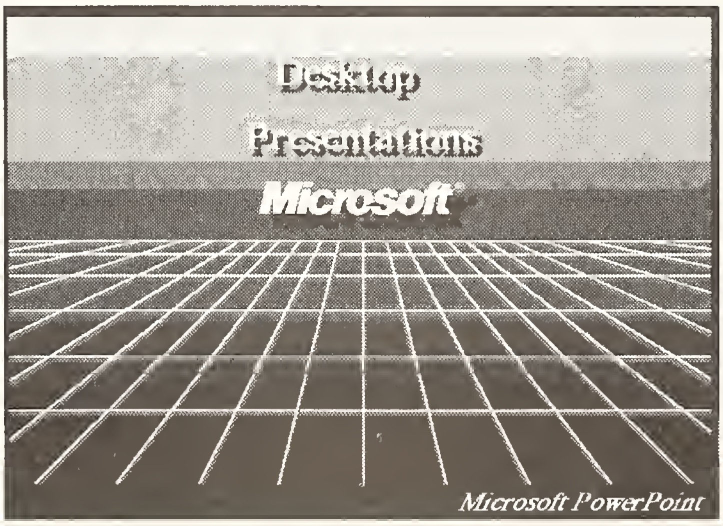
PowerPoint Features

Importing text and Graphics

- Imports directly from MacPaint™, PICT, PICT II, and EPSF
- Shows EPSF on screen and retains full PostScript® quality for printing to EPSF devices
- Imports directly from More™ and ThinkTank™ outlines
- Includes SmartScrap™ for exchanging text and graphics even if you don't use MultiFinder

Figure 1: PowerPoint's Importing Text and Graphics screen. Create in PowerPoint or import from other programs.

Figure 2: Striking graphics are even better in colour!



Desktop

Presentations

Microsoft

Microsoft PowerPoint

Once you have your presentation the way you want it, you have a number of output options. PowerPoint is capable of creating overhead transparencies, handouts, and speaker notes using a laser printer.

You can also generate high-quality 35mm slides using a device called a film recorder. If you produce enough 35mm slides, it might be worth your while to invest in your own film recorder; if this is not an option, you can take your presentation to a

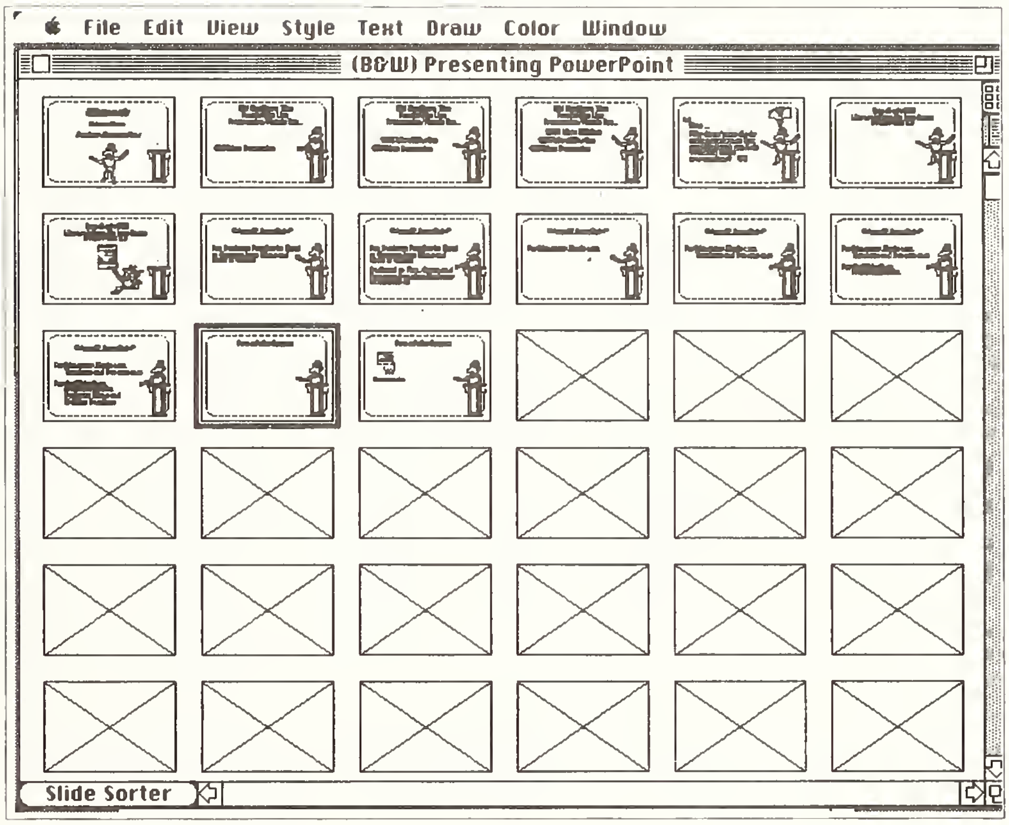

File Edit View Style Text Draw Color Window
(B&W) Presenting PowerPoint
Slide Sorter

Figure 3: Quickly arrange your presentation with PowerPoint's slide sorter.

service bureau that does have a film recorder. You may also be able to transmit your presentation over the telephone to the film recorder, and have the slides delivered to you.

Another output option is called a screen show. You can display your slides using your computer screen. A large monitor is suitable for a small audience. You can also take advantage of the computer projection screens installed by the University's Media Services in a number of large lecture rooms around the U of T campus. These are ceiling-mounted projectors that can project standard NTSC video pictures as well as almost all formats of computer screen images. In effect, you use your computer as a slide projector. Since a computer is a little more flexible than a 35mm slide, you can put a little more dazzle into your presentation by using visual effects when moving from slide to slide. Since there is no film nor film processing involved, the screen presentation is ready to show as soon as the material is finished. You are also spared the expense of buying or using a film recorder, as well as film costs.

While PowerPoint might not be the leading edge in multimedia presentations, it is an easy way to start using your computer to help you make presentations, instead of using it just for word processing and spreadsheets!

For more information or a demonstration, contact Terry Jones at 978-4924.

Accessible Computing: Adaptive Technology for Persons with a Disability

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Computers have changed the way we do our work at this University. Computers are used in the laboratory, for computer modelling, to organize ideas, to teach, to facilitate communication, to do our business accounting, for student records, to search for library material, and so on. Nearly every aspect of academic and administrative work is affected by computers, and many of us use them regularly in our work.

Unfortunately, most computers are designed for the ten-fingered touch typist with 20/20 vision. For those with a physical or sensory impairment, using a traditional computer with a keyboard and computer monitor can be difficult. Instead of being a valuable tool, the computer can become an obstacle. In this article we will explore some of the large number of adaptive devices available to make microcomputers easier to use for those with a physical disability. We will also cover some of the resources available to assist University members who need more information.

The purpose of adaptive devices is to allow equal access to standard computer hardware and software to individuals with a disability. A student with a spinal cord injury may use a breath switch to input Morse Code and produce an assignment using WordPerfect. A switch, activated by raising and lowering an eyebrow, allows a researcher with Amyotrophic Lateral Sclerosis (ALS) to input characters by selecting them from an onscreen display so she can create a LOTUS 1-2-3 spreadsheet. A blind computer programmer uses synthesized speech as a means of “reading” the screen.

Adaptive devices that provide alternative methods of input and output are available for MS-DOS and Macintosh microcomputer systems. Adaptive devices have been designed to be as transparent to the system as possible so that they are compatible with most standard computer hardware and software applications. Some of the devices consist of both hardware and software components; others are just software.

Alternative Input Techniques

A person with poor fine-motor control often is unable to use a keyboard to input data and control computer functions. However, there is a wide range of adaptive devices that allows alternative input methods. As long as a person has one functional, reliable movement, he/she is able to fully control a computer. A brief description of some of the devices and techniques follows.

Direct Access via Standard Keyboard

Simple modifications to a standard keyboard is all that is required. Key-latching software allows a typist who is only able to strike one key at a time to perform Ctrl, Alt, and Shift functions. When the Shift key is hit it latches on; striking another key produces a shifted keystroke and automatically unlatches the Shift key.

Targetting a key is often difficult for someone with a tremor or spasticity, so accidental keystrokes are made. A keyguard is a plastic or metal shelf which sits over the keyboard and has openings over the keys. The typist is then able to stabilize his/her hands on the shelf, and by inserting a finger or a typing stick into the hole, can type the

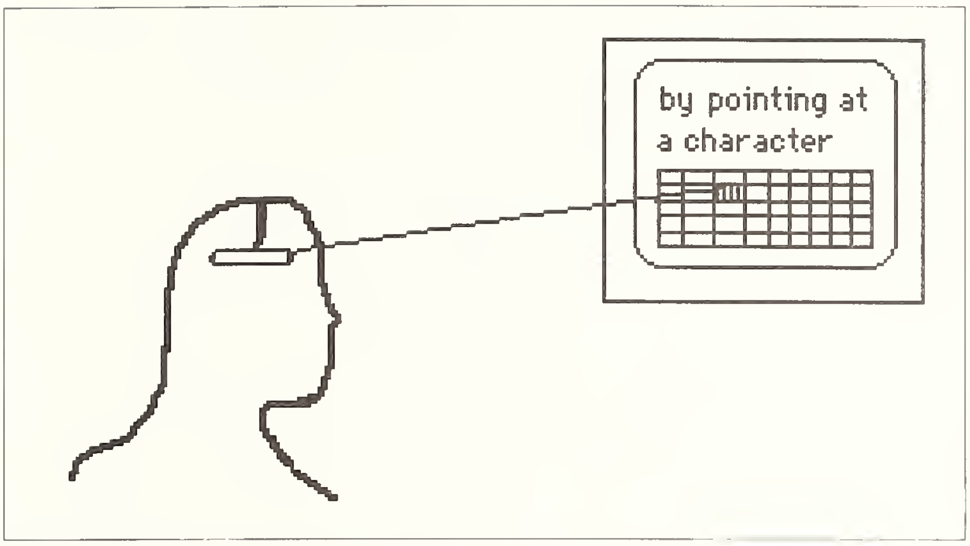


Figure 1: A headpointer or other pointing device can be used to control an onscreen keyboard.

desired character. Typing aids such as a mouthstick or a pencil attached to a hand splint are also available.

Direct Access via Alternative Keyboards

Although a standard keyboard may be difficult to use, many individuals are able to target and directly select keys when given access to an appropriate keyboard. Some alternative keyboards require a keyboard emulator as an interface, while others plug directly into the keyboard port. The keyboards may look different than the standard 101-key enhanced keyboard, but their basic operation is the same: you strike a key, by any means, directly selecting and inputting a character.

The King Keyboard, as the name implies, is an oversized keyboard with large keys that require little pressure to activate; it also provides auditory and tactile feedback. It is approximately 23.5" x 12", with 1.25" diameter keys. The TASH Minikeyboard (7.5" x 4.5") is useful for a person with good fine-motor control but a small range of motion. Both of these keyboards are statistically weighted, with the most frequently used keys located in the centre.

The size and message content of the keys on some keyboards, such as the Unicorn Keyboard, can be customized to a user's vocabulary and the application package being used. A child learning the alphabet may have a customized keyboard with just 26 larger-sized keys.

Onscreen Keyboards

For users able to use a pointing device, whether it be a mouse, a trackball, a light pen, or a special headmounted pointing device, it is possible to select characters from an onscreen visual representation of a keyboard. The user points to the character and selects it, and the character is then typed into the active application. Some products include the HeadMaster, the FreeWheel, and the LROP.

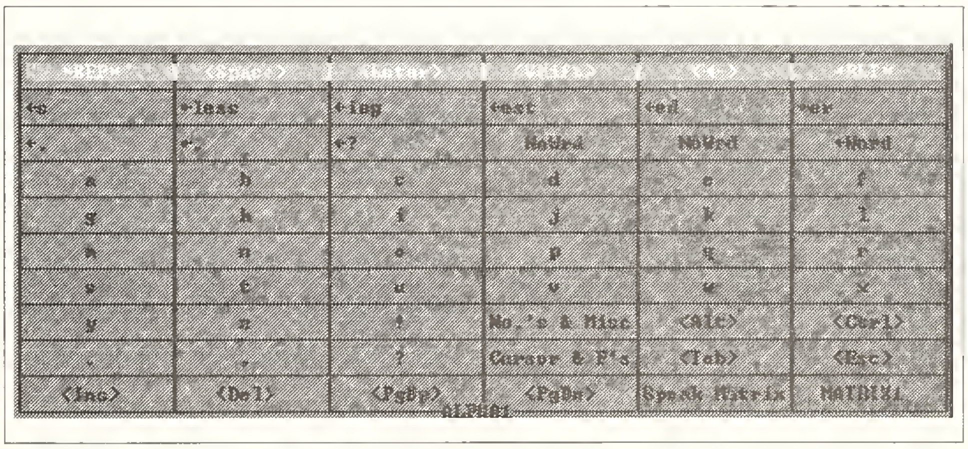
Voice Recognition

Voice recognition systems allow a user to control the computer via speech. When the user speaks into a microphone a "voice print" is made; this signal is then matched to patterns stored in a RAM-resident dictionary. Once a match has been found, the corresponding predefined keystrokes are executed. With a high-end voice recognition system such as the Dragon Dictate, or the Kurzweil Voice Report, the user may be able to input text at a rate of over 25 words per minute (wpm). Other voice-recognition cards have more limited vocabularies and are more effective as voice-activated macro systems.

Switch Access

The aforementioned direct-selection input techniques may not be appropriate for some individuals who have severely limited motion but who are able to activate a single switch. A wide range of switches is available and can be activated by exerting various degrees of pressure or movement. A pneumatic switch (sip and puff) is activated by blowing

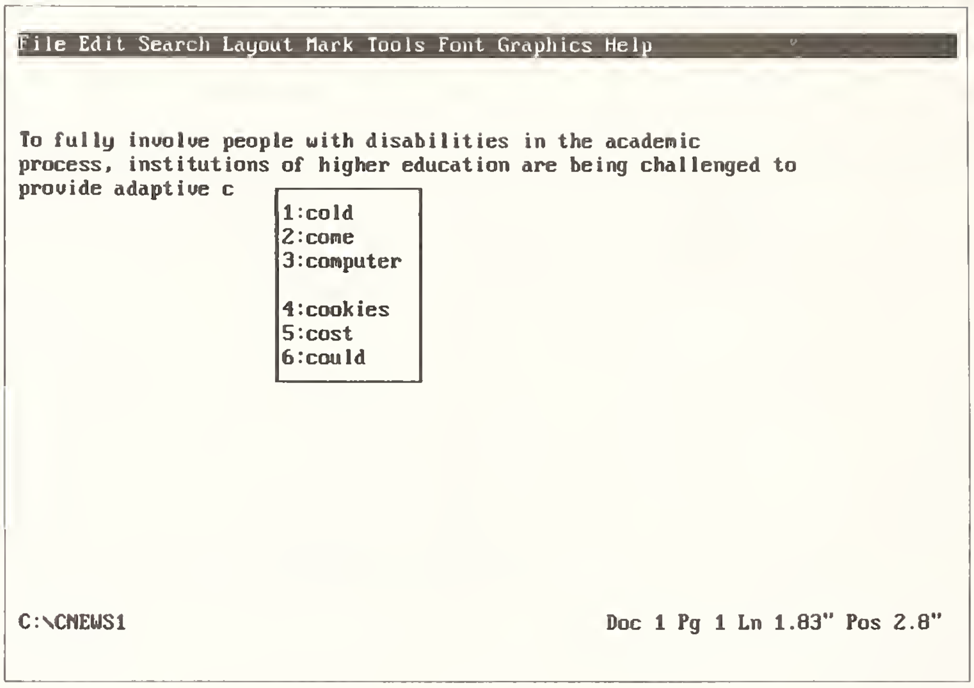
Figure 2: By using a single switch, cursor movement over an array is used to select a character and type it into the active application.



<BEEP>	<Space>	<Enter>	<Shift>	[illegible]	[illegible]
←s	←less	←ing	←est	←ed	←er
←.	←,	←?	NoWrd	NoWrd	←Word
a	b	c	d	e	f
g	h	i	j	k	l
m	n	o	p	q	r
s	t	u	v	w	x
y	z	!	No.'s & Misc	<Alt>	<Ctrl>
.	,	?	Cursor & F's	<Tab>	<Esc>
<Ins>	<Del>	<PgUp>	<PgDn>	Speak Matrix	MATRIX1

ALPHA1

Figure 3: With rate enhancement techniques such as word completion, few keystrokes are required when inputting text.



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To fully involve people with disabilities in the academic
process, institutions of higher education are being challenged to
provide adaptive c
                    1:cold
                    2:come
                    3:computer

                    4:cookies
                    5:cost
                    6:could


C:\CNEWS1                                 Doc 1 Pg 1 Ln 1.83" Pos 2.8"
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into it. Different pressure switches can be mounted in any position so that the user can use any body part to activate them. Mercury switches detect relative motion, while other switches contain sensors which detect sound and muscle activity. A keyboard emulator is used to interpret the switch activations and translate them into keystrokes which, in turn, are input into the active application. Some of the keyboard emulators available include DADA's Serial AID, Handiware, and Words+ products.

The two primary switch activation techniques are scanning and Morse Code. With scanning, the user activates the switch to control cursor movement over an alphanumeric array displayed onscreen. The user positions the cursor and selects the character with switch activation. The characters are often arranged as items in a group. The first switch hit activates the array and starts the cursor automatically scanning group by group; a second activation causes the cursor to move item by item through the selected group; and once the cursor highlights the desired character, a final switch hit selects the key.

With Morse Code, the user activates a switch to produce a dot. Holding the switch down longer produces a dash. Using two switches the process is speeded up. By "sipping and puffing" into a pneumatic switch, a proficient Morse Code user can type 25 - 35 wpm. (faster than I can type!).

Rate Enhancement Techniques

As you may well imagine, some of the described input methods are painstakingly slow and tiring. Techniques such as word prediction, abbreviation expansion, and macros serve to reduce the total number of keystrokes the user must make and thereby increases the overall working speed. These utilities can be used in conjunction with the above input methods.

Word prediction, or more aptly word completion, presents to the user a window containing words that start with the letter that has been typed. Should the desired word appear in the window, the user can select the word by typing the associated number. The word or phrase is then inserted into the application. The prediction list is statistically weighted to present words that are used more frequently at the head of the list. If your word does not appear in the list you merely continue typing and the word list is narrowed down to words that begin with that combination. Typing the word microcomputer may take only three keystrokes, a savings of 63%.

With abbreviation expansion, a word or phrase can be assigned to a label or abbreviation. When that abbreviation is typed, the full expansion is automatically inserted in the text. Typing "yt" may produce:

Yours truly,<Return>
<Return>
<Return>
Your Name <Return>

Alternative Output

For someone with a visual impairment, being able to access information presented on the screen poses a challenge.

Screen review systems and synthesized speech allow the blind user to have voice access to the screen. The system will "repeat" the user's input, alert him/her to changes in screen or program status, and will allow him/her to review text on the screen. This "talking computer" requires two main components: a speech synthesizer and screen reader software. Speech synthesizers can be internal circuit boards or external devices connected to the serial or parallel ports. Screen review software provides the user with full access to the screen by allowing him/her to move to any part of the screen, and by having the text at that position sent to the synthesizer to be spoken. The systems are programmable, allowing the user to customize them to suit a particular application. A large number of screen review systems is available, including ARTIC, VERT PLUS, and IBM ScreenReader.

For users with reduced or low vision, screen magnification and enhancement systems are available. For some people, a high-resolution 19" VGA monitor may provide sufficient magnification. For others, magnification of characters between 2 and 16 times standard size is necessary. These large print systems, both hardware or software-based, act, in effect, like a magnifying glass. Only a select portion of the screen is magnified at any one time, so the user is able to move the magnification window either by automatic scrolling, cursor movement, or via a mouse. VISTA, LPDOS, and Lyon LargePrint are just a few products. Often a person with low vision will use a combination of voice output and print enhancement.

Effect of Office Automation

Work is becoming more the manipulation of information and ideas (as opposed to objects) and computers are providing the means to do this. Other tools now being widely used in offices can be used to provide increased independence in accessing and processing information. Access to print information poses difficulties both to people who are blind and unable to see the text, and those who, due to a physical disability, are unable to manipulate paper or turn pages in books. Access to a scanner and OCR software will allow for quick and accurate translation of print into an electronic form which is then readable using any of the above access devices. Feeding paper into a FAX machine is extremely difficult for someone who is a quadriplegic. However, having an on-board FAX card allows that person to create and send correspondence independently using his/her computer. Other standard software applications and utilities such as outliners, calendars, and spelling checkers can be used to advantage by persons who, perhaps due to a head injury or a learning disability, may have diminished organizational skills or poor memory.

For a non-speaking individual, these adaptive devices can be used to control a communication device. The computer or standalone communication aid can then act as the "voice" for that person, and provide him/her with a means of independent communication. There is a large number of communication aids with various speech processing techniques.

The issues covered here are by no means comprehensive; however, they do provide a general overview of adaptive computer technology. Selection of a system is not straightforward, and it is essential that the specific goals and abilities of the individual be taken into account. For persons with multiple disabilities, some combination of the above may be most appropriate. Professional assessment and consultation services are available in the community to assist the user in selecting appropriate adaptive devices.

The University of Toronto, through Services to Persons with a Disability, provides access to computers with some modifications. They will arrange for training on and access to the adaptive computers. Lyon Large Print software, ARTIC Voice Synthesizer, IBM ScreenReader, a Braille printer, and a Kurzweil Reading Machine are available. If you would like further information, contact Jan MacKenzie at 978-8060.

UTCS is available to assist members of the university community in selecting and purchasing computer hardware and software. If you have already chosen your particular adaptive equipment, we will be able to help you select a compatible system.

In this article we have covered some adaptive devices which allow for improved access to computers by those with a physical impairment. Some of these methods may sound slow and, perhaps, even frustrating; however, with these adaptations a person with a disability is able to work independently and have access to information and the tools of work. Nonetheless, such technology is not a panacea for everyone with a disability. More research needs to be done to improve on what is available. Vendors have to improve the computers they sell so that they are usable by more people with disabilities, and so that their designs do not exclude adding adaptive devices. The goal is to ensure access to education, work, information, and communication for everyone. Not only does employment equity law mandate it, but no member of this University would want anything less.

Trendy Observations from Macworld

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In the January/February 1990 issue of ComputerNews, I reported on my impressions of COMDEX in Las Vegas, a mammoth show that tries to cover everything about computers of all kinds. This time, I want to tell you about Macworld, the major trade show for Apple Macintosh users and dealers. From August 8 through 11, over 50,000 people converged on Boston, Massachusetts for this fun and interesting show. Although it is much smaller than COMDEX, it provides a more efficient use of the attention span. This is because the otherwise lamentable absence of Macintosh clones means that almost all of the show is devoted to products you use with the Mac, not to booth after booth of computers that all look and behave essentially the same. One measure of this better focus is that despite the great difference in the size of the shows, I collected almost as much useful literature at Macworld as I did at COMDEX.

Many different trends could be seen, depending on the perspective of the observer. To me, the most significant has to do with interaction between many kinds of things. This is not just connectivity between hardware products and interoperability between software packages, but both of those and more. Multimedia products were everywhere, along with products for collaborating with colleagues near and far. There was great interest in moving data easily from one medium to another, and not just between electronic media.

As I look through my stack of brochures, here are some of the most interesting products.

Multimedia

Apart from games (which I didn't look at), the most entertaining packages are, of course, the ones that use multimedia. Several powerful programs exist now for capturing and editing audio and/or video input, overlapping one or more sound tracks, and smoothing over the joins between segments with a variety of fade-out/fade-in options. One desktop publishing product captures real-time video and places it directly into the text page; you watch the video running in the page and freeze it whenever you like. To me, at least, these packages seemed wonderfully easy to use, though graphics and publishing specialists might have had complaints about how various functions were handled.

Scanners, Scanners Everywhere

It is only a small exaggeration to say that almost any company that ever made a printer, photocopy machine, or camera now makes a scanner too. Hand-held scanners are no longer rare, and some of them even work well. Of course, scanners by themselves are pretty useless, but this trend is matched by new or improved software for handling graphical images and, especially, optical character recognition.

The two most interesting products of this kind that I saw are at opposite ends of the spectrum. One is a five-inch scanner that scans graphical, typed, or printed copy and inputs it directly into your open application at 500 words per minute or two inches per second. If the source copy is more than five inches wide, a "line stitching" feature puts the document back together.

The other product I saw is for graphical images only. It consists of a camera that records images on two-inch disks and/or a scanner that can handle three-dimensional objects; a disk drive unit for the disks, which also serves the function of a video-capture board for the scanner; and software to manipulate colour, size, and orientation. It also exports in TIFF and PICT formats if you want to do further editing with another imaging product.

Collaborative Computing

Software that allows a user at one machine to see and take over the screen of another has been available for some time now. This kind of setup has generally been used by network administrators and people at corporate help desks. Groupware packages have also been around for a while, though more in the IBM world. These packages allow people working on the same document to circulate it electronically, making changes and comments as it goes. These two software approaches have now been combined to allow people in different offices, buildings, or cities to look at and edit the same document at the same time. (This is not the same as a multiuser database, for example, where the object is to make users feel they each have their own copy of the data. Rather, it is an attempt to simulate a group of people gathered around a table to work on the same document.) With the addition of teleconferencing, "data conferencing" can be a remarkably productive tool. This particular kind of product is still very new—the one I saw at Macworld is still in beta test—but this is clearly an idea whose time has come.

Project Management and Thought Organization

An increasing number of packages is appearing for organizing information in more sophisticated ways. Project management is one important subcategory. These products offer various strategies and range from the simple to the complex. The simplest ones aren't much more than calendars and schedulers; they may even be desk accessories. The high-end ones, however, handle multiple projects, especially those sharing a resource pool. These may seem at first to be overkill for a university department, but in fact it is just such places with stretched resources that might benefit the most.

Another subcategory is software that tries to clarify your thinking. These are like modelling software except that modelling is normally specialized for particular purposes. They might be described as generic modelling software. Usually you start by making some kind of visual representation of the issue at hand, showing the relationships between various factors and hopefully generating some insights. You can also move the factors around to answer your "what ifs."

Programs that analyze information geographically may not generate enough demand to warrant a trend, but I did see one that might be just the thing for some people on campus. This is a relational database program with extra layers. Data from a database, either the package's or one of several supported Mac databases, can be analyzed and shown in a meaningful way in charts or on maps. The program has maps for all countries and detailed maps of many countries including Canada and the United States, often down to street level. Maps of different types can be overlaid. The product also supports hot links between a database and its maps and charts, so that data changed on a map, for example, is also changed in the database and the charts.

Hardware (mostly)

The most common single type of hardware visible at this show was probably the hard disk, specifically the external hard disk. Portable hard disks are becoming more and more sturdy and compact. I saw one that was about two inches high, seven inches long, four and a half inches wide, and weighed about two pounds. The interest in storage space extends to compression software as well—several new or upgraded compression utilities were on display.

Lots of people are looking at ways to increase Mac power. Last year, Compaq introduced parallel processors for micros in the IBM arena. A few companies now make cards that bring this "transputer" technology to the Mac community. So far there appears to be only one software developer producing packages that can take advantage of it, though that will surely change. Another hardware company produces a Mac workstation (the first time I've seen a Mac as a "tower" computer) aimed at significantly increasing computational speed and throughput.

More products are coming out for people who must cope with mixing Macs and PCs. The most interesting to me is a card that goes into a PC, connects directly with AppleTalk, and includes all necessary software for printing and AppleShare. This is not the first solution to this particular connectivity problem, but it is simpler and far less expensive than what has been available up to now.

Miscellaneous

This is not a trend, but I thought of many people on campus when I saw that the Avery label people have come out with their own software for merging and printing on just about all of their products (well, maybe not the really small stick-on dots). The print merge works with "most popular software programs." Graphics can be created or imported as well.

The Dirt

Most of these shows begin with some kind of keynote extravaganza, and Macworld is no exception. In this case, it was highly political, since Apple has undergone major management upheavals in the past year or so and has "turfed out" some people who were there "from the beginning." A panel of five notables from Mac-related software companies, moderated by the requisite gadfly journalist, composed an open letter to Apple president John Sculley, each adding something to the want list (a want list is less polite than a wish list). Some of their demands included lower prices (loud cheers from the audience), stabilizing Apple management (loud laughs from the audience), and a reversal of the reversal of Apple's original plan to make Claris, its software company, independent. (Claris makes many of the standard Macintosh packages, such as MacWrite, MacDraw, and MacPaint. Some of the smaller software developers are afraid that after reabsorbing Claris, Apple will begin to bundle these products with the Mac, thereby knocking out some of the competition. One of the people on the panel was the president of Claris, who expressed real or mock concern for his job as he put this subversive item in the letter; this drew sympathetic applause from the audience.) After the panel, an ever-so-casually attired John Sculley gave a prepared pep talk and presided over a carefully orchestrated demonstration of some new Mac products that were being unveiled at the show. Though he made no reference then to the panel's concerns, he did acknowledge them at a later press conference.

Macworld in Toronto

If you would like a taste of Macworld, a smaller version is coming to the Better Living Centre at the Canadian National Exhibition grounds from October 23 through 25. An admission badge for exhibits only costs $25 at the door; conference sessions plus exhibits cost $90 at the door. If you would like more information about the show, call the Macworld Expo Hotline at 416-742-9607.

ProComm Communications Program Seminar

Monday, October 29
12:00 - 2:00 p.m.

ProComm is a general purpose communications program currently available to all U of T faculty, staff, and students. It is suitable for connecting to the many networks on campus.

A seminar has been scheduled to introduce ProComm and its various features: terminal emulation (a number of popular ones will be reviewed); the dialing directory; file transfer protocols, such as Kermit and XMODEM; configuration and modem parameter settings; and the DOS gateway, which allows you to execute DOS commands and other programs while you are still in ProComm.

There is a fee for this seminar. Copies of ProComm are made available at no charge to members of the University, but you must bring your own diskettes (two 5.25" or one 3.5").

To reserve a place in this seminar, please contact Irene Rosiecki at 978-4565.

Free NetNorth (Electronic Mail) Demonstration

Monday, October 29
2:00 - 4:00 p.m.

Tuesday, December 11
10:00 a.m. - 12:00 p.m.

Anyone interested in sending documents to colleagues or friends reliably, quickly, and inexpensively will not want to miss this demonstration. We will introduce you to the NetNorth/ BITNET/EARN communications network, which is accessible from the CMS system. This network connects more than a thousand universities and research institutes in Europe, Asia, and North America. Sending documents or files over the network is very easy to learn.

We will show you how to send mail and files to another institution, and how to talk directly to someone on the network. ***Please note this is a demonstration only.***

Space is limited. If you would like to attend one of these sessions, please contact Irene Rosiecki at 978-4565 to reserve a place.

Microcomputer Short Courses

Irene Rosiecki
rosiecki@vm.utcs.utoronto.ca

UTCS offers various noncredit microcomputer courses to faculty, staff, and graduate students of the University of Toronto. These courses cover a number of software programs available for the PC or the Macintosh. Whether you will be typing a thesis on a word processor, or working with spreadsheets, databases, or desktop publishing, we may be able to help you get started.

Our class sizes are small to allow for much individual attention. Continuing support is available upon completion of a course.

The following is a list of the microcomputer courses taught at UTCS:

- Introduction to dBASE IV
- Introduction to Disk Operating System (DOS)
- Electronic Mail Seminar
- Excel on the Macintosh
- Introduction to FoxBASE+/Mac 2.0
- Introduction to HyperCard
- Introduction to Lotus 1-2-3
- Introduction to PageMaker
- ProComm Communications Seminar
- Introduction to SAS on the PC
- Intermediate SAS – Data Processing
- Intermediate SAS – Statistics
- SAS/Graph Seminar
- Microsoft Word on the Macintosh
- Microsoft Word on the PC
- Introduction to WordPerfect 5.1
- Advanced WordPerfect 5.1 Topics

To find out about course dates and registration procedures, or to book a place in any of these courses, please contact Irene Rosiecki at 978-4565. Courses are filled on a first-come, first-served basis. The more popular courses fill up quickly, but waiting lists are maintained in case of cancellations.

St. George Campus: Undergraduate and Research Access

Dan Lemmon
dan@gpu.utcs.utoronto.ca

Engineering Annex
11 King's College Road
Floors 1 and 2

The Annex consists of two areas: the General Purpose Facility and the Computer Disciplines Facility (CDF). The General Purpose Facility has 12 public CRT terminals in Room 107B connected to the PACX. From these, any user may access the VM system (CMS), GP UNIX, or other systems. For output, the facility provides an SSI QT600 line printer in Room 107B. For assistance in using any of these machines, please see the site coordinator in Room 201B.

The Annex is also the site of the Computer Disciplines Facility (CDF). This facility is managed by UTCS for the Department of Computer Science. The facility's hardware consists of two SUN 3/280 units running SUN OS 4.0.3 (UNIX) to support approximately 70 terminals in Rooms 107 and 201. These terminals are hardwired to the SUNs and are used exclusively by students in Computing Disciplines.

Facilities in the Engineering Annex are open 24 hours a day.

Robarts Library
140 St. George Street
Room 1061A

The lower level of Robarts Library houses 24 public terminals that allow users access to UTCS' general purpose systems (CMS, GP UNIX) or to other systems via PACX. Also located in the room are 37 NEC PCs (CDF/PC) dedicated to undergraduate computing in Computer Science. The Robarts Library Facility has an SSI QT600 line printer that supports PACX users and CDF/PCs.

This room is available to researchers and undergraduate users during the Library business hours, which for most of the year are as follows:

Monday - Friday	08:30 to 24:00
Saturday	09:00 to 17:00
Sunday	13:00 to 22:00

There is no full-time site coordinator.

Arts and Science
Sidney Smith Building
100 St. George Street
Rooms 2105, 1071

Room 2105 holds ten DECstations (model 2100), 20 VT1000s, and one DECstation 5000 (file server) that runs Ultrix 4.0 and is connected to the campus network. Use of the workstations is limited to five departments (Botany, Geography, Psychology, Zoology, and Statistics). Local printing is available via three QMS PS810 laser printers (with Postscript support).

Also available are three AT-type machines with Ethernet adapters. They are available for uploading and downloading files. These AT machines have both 3.5 and 5.25-inch diskette drives.

In Room 1071, UTCS operates 24 NEC PCs dedicated to undergraduate computing in Computer Science (CDF/PC). The networked PCs share an SSI QT600 line printer located in the room.

The facilities are available:

Monday - Sunday	07:00 to 24:00

Ramsay Wright
25 Harbord Street
Room 211

There are ten DECstations and 29 VT1000s located at this site. Use of the workstations is limited to the same five departments as at 2105 Sidney Smith. There is local printing via three QMS PS810 laser printers (with Postscript support).

Also available are three AT-type machines with Ethernet adapters. They are available for uploading and downloading files. These AT machines have both 3.5 and 5.25-inch diskette drives.

During the school year (September through May), this site is open:

Monday - Thursday	07:00 to 21:00
Friday	07:00 to 18:00
Saturday	Closed
Sunday	Closed

St. Michael's College
121 St. Joseph Street
Room 107

This site has 26 NEC PCs for DCS undergraduate computing, plus nine public terminals connected to the PACX. Any of these terminals can access any system available via PACX. Both facilities (CDF/PC and public terminals) share an SSI QT600 line printer.

During the school year (September through May), this site is open 24 hours a day. There is no full-time site coordinator at this location.

Trinity College
6 Hoskin Avenue
Room 24

The Facility in this College accommodates two public terminals connected via PACX. There are no printers available at this site.

During the school year (September to May), the site is open daily from 08:00 to 22:00. There is no full-time site coordinator.

Victoria College
73 Queen's Park Crescent
1st Floor

There are three public terminals connected to PACX. Printing is not available at this site.

From September to May, the facility is available Monday through Friday, 08:30 to 23:00. There is no full-time coordinator.

PC Virus Tools

Jon Alexander
jon@utcs.utoronto.ca

The Advising Office has been involved extensively in efforts on campus to prevent loss or damage of computer data due to computer viruses. We recently reviewed three of the most common packages available, including the package we have been supporting in the Advising Office up to now.

Microcomputer virus tools fall into two categories: detection and prevention. Each of the three packages we examined had capabilities in both these areas, but they weren't always equal in strength.

Viruscan

Viruscan is actually part of a suite of programs that includes Scan (also known as Viruscan) , V-Shield, and several "disinfectors" (e.g. Clean-up). It is a package that the Advising Office has been using and can support.

The McAfee programs are "shareware" - each copy should be registered with the company that distributes the programs at the address indicated in the accompanying documentation.

The programs are straightforward to run, and come with some simple documentation and a list of viruses that they can detect and disinfect. The programs are best used by keeping them on bootable disks (floppy disks that can also start up the DOS system) and write-protecting them, so that they can't become infected.

There are, however, some limitations to the McAfee programs. The documentation for Clean-up, the principal "disinfection" program, indicates that it can't disinfect all of the viruses that Scan can locate; in cases where the infection is by one of the viruses Clean-up can't disinfect, it will prompt the user, and upon authorization delete the infected file and erase it from system memory. This is a drawback to the program which makes it difficult to use in the case where the DOS system files are infected by one of the uncleanable viruses.

There is one caution about using the Clean-up program, which is highlighted in the documentation. It states that "Removing the Stoned virus can cause loss of the partition table in systems with non-standard disk controllers or systems that use special purpose device drivers for disk access." (The Stoned virus is a virus we have seen on the University of Toronto campus.) They recommend backing up all critical data before running Clean-up.

Distributor:
McAfee and Associates
4423 Cheeney Street
Santa Clara, California 95954
USA
Phone: 408-988-3832

Anti-Virus

The **Anti-Virus** package is also a collection of programs that come together on one disk. They are executed by two "batch" files (programs containing the simple DOS commands to execute each part of the package and give the appropriate messages). The package is meant to be installed on a hard drive in the case where one is present, and comes with a very simple install procedure.

We found it easy to install on a hard disk, but we had some difficulty upgrading to a newer version (the crucial DOS files that Anti-Virus alters, AUTOEXEC.BAT and CONFIG.SYS, had to be restored by hand because the new version overwrote them and couldn't find them. It may be that you have to fully de-install one version before upgrading). The latest version seems to de-install fine without upgrading.

Documentation is simple and sparse; some things are not explained, such as whether the Anti-Virus package provides preventative measures as well as scanning and disinfecting

Anti-Virus does detect the same extensive list of viruses as that of the McAfee Scan program. The difference is it will also disinfect (according to the documentation and the company that distributes the package in Canada, Fink Enterprises) ALL the viruses it detects, not just a subset of them like the McAfee programs do. This is a major advantage over the McAfee package.

Academic pricing and site-licenses are available for Anti-Virus, according to the distributor. UTCS has pricing information.

Distributor:
Fink Enterprises
11 Glencameron Road, Unit #11
Thornhill, Ontario
L3T 4N3
Phone: 416-764-5648

F-PROT

F-PROT is an anti-virus package developed by a contributor to the world-wide discussion group on computer viruses.

It is a large collection of programs, 21 in total, each with a specific task, including defense against virus infection, identification of viruses, and self-checking and removal of viruses from DOS system files.

F-PROT is set up in such a way so that you can configure your system to have the level and type of protection and security you desire; it has no simple "install" utility. It is designed, though, to be installed on a hard disk if your system has one; installation requires that you have a good knowledge of DOS, and FPROT's instructions contain a warning to this effect.

There were some difficulties: the program is difficult to install on your hard disk because it requires you to know exactly how you want it configured; some of the messages are in another language, one we did not recognize (the package was developed in Iceland, but different language versions that were internally consistent would be a necessity with a virus-checking program) and some of the messages don't print at all, even though the documentation suggests they will.

The package is "shareware", and you can obtain a copy of it from many academic sites on the INTERNET electronic network. UTCS has a copy.

Distributor:
Available at many academic sites through electronic file transfer. You can obtain a copy from UTCS.

Summary:

Of the three packages, Viruscan and Anti-Virus were full-featured and easy to learn how to use. Anti-Virus seemed to exhibit a problem with upgrading versions, but the problem was minor. Anti-Virus had the most complete list of viruses it could handle, although it tied with Viruscan in the number of viruses detected.

Currently, Viruscan is the anti-virus product we recommend for PCs running the PC/MS-DOS operating system. There is one exception: in the case where you have one of the viruses that Viruscan's Clean-up program can't disinfect, you may want to consider using Anti-Virus. For more information, you can contact the Advising Office at 978-HELP.

CASim™

Cellular Automata Simulation Program for the Macintosh II

One of the fashionable, catchy words in the field of computer applications is "simulation." If a real-life problem cannot be described analytically, you can try to simulate the system on a computer to gain an insight into its behaviour. A cellular automaton (CA) is a particularly simplified view of the world – it represents the world as divided into discrete cells, like a giant spreadsheet.

Each cell has a number associated with it, characterizing its state. Time is viewed discretely, as changing in steps called generations. A cell (i.e., a cell's state) may undergo changes from one generation to the next one, depending on the states of its neighbours and its own state. Various CAs differ from one another by the rules governing this change. In spite of the crudeness of the cellular automata view of the world, simulations based on cellular automata have spread across nearly every discipline of science, from biology to astrophysics. Probably the best known example of CA is the game of Life, invented in 1970 by John Conway. (For an introduction to cellular automata see "Computer Software in Science and Mathematics" by Stephen Wolfram, *Scientific American,* September 1984, page 188.)

CASim™ is a program for exploring the CA world for Macintosh II computers. It has a number of known CA rules programmed into it (nine different classes of rules), but you have the freedom to change the values of the parameters of the underlying algorithms. In the case of the NLUKY rule (explained below), varying the values of the parameters produces 700,000 different rules, of which the famous "Life" rule is but one. CASim™ also allows you to define your own rules. Although there are some limits to these custom rules, the number of rules that you can create is very large – a little over 2^{107} rules are possible (i.e., 1.75×10^{32}), enough to keep you busy for a while!

When you start CASim,™ you see a window called CA Land. This is your view of the Universe where the cellular automata cells live. The CA Land may have two different topologies: Flat World (borders of the CA Land window are edges of the CA universe), and Torus World (leaving the CA Land through the right [left] edge, you enter it through left [right] edge, and the same for upper and lower edges).

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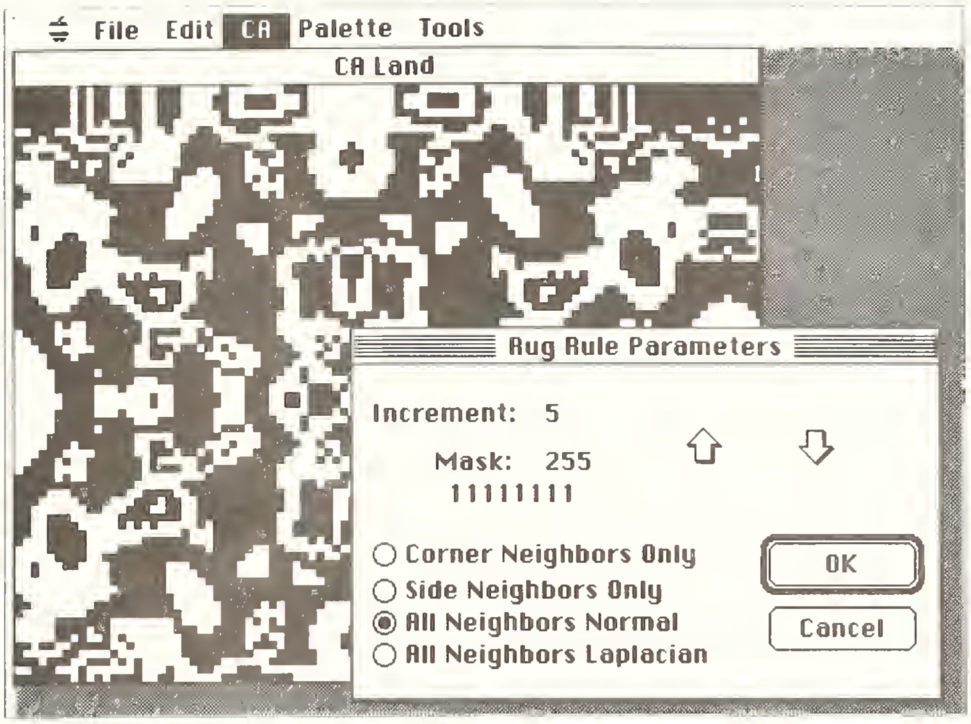


Rug Rule Parameters

Increment: 5

Mask: 255
11111111

○ Corner Neighbors Only
○ Side Neighbors Only
● All Neighbors Normal
○ All Neighbors Laplacian

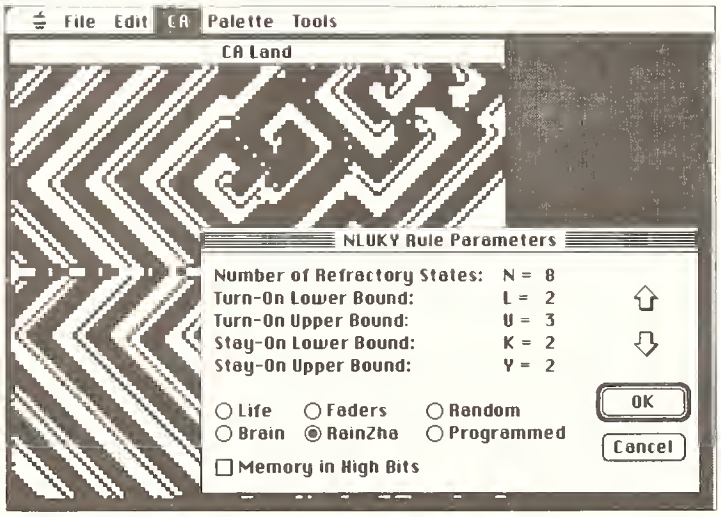
Figure 1: CA Land window for "Rug Rule" simulation and "Rug Rule" parameters window.

At the top of the screen you see a menu bar with the following items: File, Edit, CA, Palette, and Tools.

The File menu allows you to save statistical information on the CA simulation you are running (for instance, how many cells are in each possible cell state); to read in a file with Custom rules or save to a file the rules you have devised for use at some other time; to save the image currently displayed in the CA Land window; or to load from a file an image saved previously. You can also save full-colour animations of your CAs as they run in the Movie files. Movies will play back the animation much faster than actually running the CA simulation since no calculation takes place.

The Edit menu has only the Clear command enabled; this clears the CA Land window.

Figure 2: CA simulation for a NLUKY class rule. The parameters window is open, showing the specific values of parameters.



NLUKY Rule Parameters

Number of Refractory States: N = 8
Turn-On Lower Bound: L = 2
Turn-On Upper Bound: U = 3
Stay-On Lower Bound: K = 2
Stay-On Upper Bound: Y = 2

○ Life ○ Faders ○ Random
○ Brain ● RainZha ○ Programmed

☐ Memory in High Bits

The CA menu contains commands that directly control the CA simulation. First, you have a choice between CA Land topologies: Flat World and Torus World. You can specify the size of the CA Land (its width and height in cells), and you can change the size of the CA Land by dragging the lower left corner of the CA Land window to the new size you want. Second, you can choose the rule according to which the CA universe cells will change. As mentioned above, there are nine different classes of preprogrammed rules, but for each of them you have the freedom of changing the relevant parameters. One of these classes is NLUKY, the name being derived from the five parameters governing the rule:

- **N** is between 0 and 254
- **L** is less than or equal to U and both are between 0 and 8
- **K** is less than or equal to **Y** and both are between 0 and 8

The famous Life rule is realized for N=0, L=3, U=3, K=2, Y=3. Third, you can choose to run CA simulation in single steps or continuously. Finally, the CA menu allows you to record a Movie, play a Movie, or rewind it.

The Palette menu controls how colours appear in the CA Land window. Each cell in CASim™ has

256 states, and you can use 256 colours to show these states. The Palette menu allows you to choose how the colours will be used to code the cell states. You can also decide whether the CA Land background will be white or black, and choose the size (in pixels) of a single cell. Finally, there is an option allowing you draw your own images in the CA Land window, i.e., to set individual cells' states by hand.

The Tools menu offers a number of utilities to help you explore the CA rules you simulate. For instance, it allows you to start simulation from a random distribution of cell states to see what develops, or you can decide to do some randomization every "so many" generations. You can have a grid drawn in the CA Land, show the generation number, have cells divided by a white or black space, or decide after how many generations the simulation is to stop (with a beep to wake you up!). You can also periodically do data logging, i.e., record the state of the cells in the CA Land to a Macintosh TEXT file.

Figure 1 and *Figure 2* show two different CA simulations, with the corresponding parameter windows open. The first one belongs to the Rug Rule class, and the second one to the NLUKY class, discussed above. The particular set of NLUKY rules realized in *Figure 2* leads to patterns similar to the ones developing in the spiralling chemical reaction called the Belousov-Zhabotinsky reaction. This is just one example of a CA simulation mimicking the behaviour of a real system. Both figures look more attractive and are more informative when you can see them in colour. Unfortunately, since *ComputerNews* is not printed in colour, the figures lose their impact. Other rules, included in the program's set of preprogrammed rules, may be used to simulate crystal growth, diffusion, movement of electrons in logic circuits, or the interaction of species in an ecological environment.

In summary, CASim™ is an interesting, inexpensive program for cellular automata simulations, which may allow you to both familiarize yourself with the CA world and to try your own simulations. Considerable flexibility in setting up custom rules makes the program applicable to simulations in very diverse fields. The manual is well-written, and gives numerous examples of CA applications in different areas. The program diskette also contains several exemplary simulations, which you can run immediately to get a taste of the CA's capabilities. The program makes a good use of the Macintosh interface, although Macintosh conventions are not always strictly followed.

If you would like to see the program in action or to try it yourself, please contact Andrzej Pindor at 978-5045.

Hardware Requirements:
Macintosh II with at least 1MB RAM;
2MB RAM, 256 colours, 32-bit Colour QuickDraw highly recommended;
(recording movies requires a lot of free disk space)

Vendor:
Mr. Kenneth Karakotsios,
1272 Copper Peak Lane,
San Jose, CA 95120
USA

Price:
US $29.95

SPSS News

It is time to renew your license for SPSS/PC for the period from November 1, 1990 to October 31, 1991. The renewal fee this year is $100. Renewal notices will be mailed, but if you require a renewal form, call Evelyn Ward at 978-4990 to have one sent to you.

Renewal Notes

At renewal time, if you wish to update or install a program and you have to borrow installation diskettes from UTCS, there are a few things you should keep in mind. UTCS has a limited number of copies of each program available, so please call ahead to reserve the diskettes you require. This way we can ensure that they are on hand when you come in with your renewal form. A twenty-five dollar deposit for each box of diskettes is required. (SPSS requires two boxes.) Cash, cheques, appropriation accounts, and CAN numbers are acceptable forms of deposit. When you return the diskettes, UTCS refunds your money. Call Evelyn Ward at 978-4990 if you would like more information.

MATRIX: An Interpreted Matrix Language for PCs

Andrzej J. Pindor
apindor@vm.utcs.utoronto.ca

There are available for DOS-based microcomputers several software products which perform matrix computations. Some time ago I reviewed two of the best known of them: GAUSS in *ComputerNews* issue #246, April 1988, and issue #247, May/June 1988; and MATLAB in *ComputerNews* issue #248, July/August 1988. MATRIX is a similar product, although more modest and correspondingly less expensive (in fact, much less expensive).

MATRIX is an interpreted language, which means that, when invoked, it creates an environment in which you define variables (all variables in MATRIX are either numeric double precision or character matrices) and issue commands that are acted upon immediately.

One of the aims of MATRIX's creators was to keep it simple; thus, its vocabulary of commands has only about 100 items, but they seem to cover most needs.

Mathematical features include most standard matrix functions:

Matrix multiply, inverse, eigenvalues and vectors, singular values, sweep, QR and Cholesky factorizations, determinant, trace, generalized inverse, quick sort, solution to triangular linear equations, max, min, transpose, vector to diagonal matrix,
vector diagonal, creation of a matrix of constants, a vector of incrementing (decrementing) values, identity matrix,

and standard element-wise functions:

abs, atan, cos, exp, int, ln, powers,
sin, and sqrt.

You can concatenate matrices horizontally and vertically, and you can access individual elements, rows, columns or selected submatrix of a matrix.

Matrices can be written to and read from external files in two formats: ASCII and binary.

Although MATRIX can be used in any area where matrix computations are required, it has a number of features which make it particularly useful in statistically-oriented applications. These features include generating random matrices from 24 continuous distributions (normal, uniform, exponential, Laplace, logistic, lognormal, Cauchy, betaodds, to mention just few), distribution and quantile functions and densities for 23 distributions, and non-parametric data smoothing by the method of kernels. Computing one- and two-dimensional Fast Fourier Transforms (FFTs) is also included.

The number of matrices is limited only by Random Access Memory (RAM; up to 640KB of RAM is used) and individual matrices may have up to 8190 elements. A nice feature of MATRIX is that matrices, as well as names (one to eight characters or digits long), may also have labels attached to them (up to 40 characters long).

Structured IF and WHILE statements give MATRIX programming capabilities. There is also a command, EXTERN, which allows users to to access external programs written in MS FORTRAN, Pascal, C, or Assembler.

Frequently-used sets of commands and MATRIX programs can be saved as macros and then recalled and executed when required. MATRIX includes its own editor for writing and modifying macros.

MATRIX has also modest graphics capabilities. You can create two-dimensional plots, annotate, and/or overlay them, and also read coordinates of points from a plot. Graphics screens can be dumped to either IBM or EPSON graphic printers.

In conclusion, MATRIX is a inexpensive program for matrix computations, with special emphasis on statistical applications. It is simple (yet quite powerful) and easy to use. It should appeal to a wide variety of microcomputer users who have modest computational needs, and who do not want to bother with the complexities of full-fledged products like GAUSS or MATLAB.

For more information about MATRIX, call Andrzej Pindor at 978-5045.

Hardware Requirements:
IBM PC (XT, AT, PS/2) or compatible,
at least 384KB, CGA (or EGA/VGA in CGA mode).
Can be run from a floppy.
Numeric coprocessor recommended but not required,
MS-DOS version 2.00 or later.

Vendor:
William P. Alexander,
3159 Roxburg Drive West,
Lexington, Kentucky 40503
USA

Pricing:
US$50, student rate US$20 per copy (minimum purchase 5 copies and the instructor's copy is free)
Available on 5.25 and 3.5 inch diskettes.

UTCS Services

Facilities Managed by UTCS

Administrative Computing
- administrative IMS, DB2, Batch, and TS0
- 3081K processor, 48 megabytes of memory
- MVS/XA operating system

Computer Disciplines Facility/UNIX
SUN 3/280s, 16 megabytes of memory (zero.cdf)
- Computer Science interactive access
- SUN UNIX 4.0.3

SUN 3/280s, 16 megabytes of memory (one.cdf)
- Computer Science interactive access
- SUN UNIX 4.0.3

Computer Disciplines Facility/PC
- 88 NEC computers connected in a Local Area Network:
  •Robarts Library (Rm. 1061A): 39 NEC PCs
  •St. Michael's College (Rm. 107): 26 NEC PCs
  •Sidney Smith (Rm. 1071): 23 NEC PCs
- MS-DOS with Turing environment
- introductory computer science

Computers in Quantitative and Empirical Science Teaching (CQUEST)
- 49 DEC VT1000 X-window terminals, 20 DEC 2100 workstations connected in Local Area Network:
  •Ramsay Wright (Rm. 211, 213): 29 DEC VT1000s, 10 DEC 2100s
  •Sidney Smith (Rm. 2105): 20 DEC VT1000s, 10 DEC 2100s

Public Sites
- 50 XT100 terminals connected to PACX
  •Robarts Library (Rm. 1061A): 24 terminals
  •Engineering Annex (Rm. 107B): 12 terminals
  •St. Michael's College (Rm. 107): 9 terminals
  •Victoria College (Rm. 208): 3 terminals
  •Trinity College (Rm. 024): 2 terminals

Erindale College Systems
SUN 3/280, 16 megabytes of memory
- instructional and research access using UNIX

VAX 8200, 8 megabytes of memory
- instructional access using VMS
- research access

VAX-11/750, 5 megabytes of memory
- instructional access using UNIX (Berkeley UNIX 4.3BSD)

Institutional Relations System

VAX-11/750, 8 megabytes of memory
- database services to the owner departments using VMS

EPAS Facility
- 4361-5 processor, 16 megabytes of memory
- general VM/CMS services to the owner departments

Ontario Centre for Large Scale Computation (OCLSC)
- Cray Research Inc. X-MP/24
- 2 processors, 4 megawords main memory
- solid state disk (SSD) with 64 megawords of storage
- UNICOS 5.1.10 operating system
- VAX 8350 + MicroVAX II, VAX-11/750, and SUN 3 provide VMS front-end services

> *The mandate of UTCS is to encourage and support the use of information technologies across campus, and to plan, implement, and operate common-carrier networks and certain appropriate central computer facilities.*

UTCS Centrally Owned and Managed

Systems

IBM VM/CMS
Technical Assistance: 978-6602
- General Purpose Timesharing environment
- Hub of the NetNorth network with access to BITNET, EARN and the Internet
- 4381-R02 processor with 32 megabytes of memory
- CP operating system, VM/SP HPO R5
- CMS timesharing system, VM/SP Release 5
- FTP and TELNET access to the campus ethernet, as well as Internet
- RSCS spooling system, Release 2.3

GP UNIX
Technical Assistance: 978-8853
- General Purpose Timesharing under SUN UNIX 4.0.3
- SUN 3/280, 16 megabytes of memory
- access to Linotronic typesetter
- offers a sophisticated and powerful environment for text processing
- offers a sophisticated programming environment suitable for commercial software development or testing
- full access to USENET, an electronic technical information exchange facility
- offers excellent electronic mail facilities and ability to send or receive mail from most computer networks worldwide, such as UUCPNET, ARPANET, NetNorth, BITNET, CSNET, CDNNET

Services

Communications, Networking & Technical Support
Primary Phone: 978-7087
- Communications Group provides communications systems, terminals, modems, data channels: consulting and installation.
- Field Service Group installs and maintains communications and computer systems, particularly IBM PCs and Macintoshes, on a contract basis or on a cost-per-call basis.
- provides consulting on computer systems technology and installs computer systems
- provides access between the IBM systems and machines using UNIX, VMS and other operating systems. Ethernet, Pronet, and IBM TRN technologies are used over various transmission media including optical fibre. More basic communications techniques are also used for moderate speed links.
- provides consulting on local area networking and installs LANS
- provides access to NetNorth (BITNET), the North American Universities Network; ONET, the Ontario Regional Network; CA*net, the Canadian National Network; and USENET, the UNIX networking fraternity
- provides gateway to the US Internet
- will provide a communications solution to department needs on a contractual basis

Information Centre
Primary Phone: 978-HELP
- Provides assistance in use of electronic messaging, including use of Local Area Networks (LANS); NetNorth/BITNET/EARN, the world Universities network; CDNNET, the Canadian X.400 network; ARPANET; CSNET; USENET; and other international connections.
- provides advising, consulting and documentation on:
  - command languages, including CMS and UNIX
  - high-level languages, including FORTRAN, and C
  - packages and libraries, including SAS, SPSS, BMDP, IMSL, and NAg
  - editors and formatters, including XEDIT, ed, nroff/troff
- provides general micro support
  - selection consulting for hardware and software
  - Micro Lab for evaluation of hardware and software
  - advice on University discounts
  - media conversion and data transfer
  - CD-ROM access to software and information discs
  - offers PostScript Laser Printing Service
  - offers 35mm slide production service using Polaroid Palette
  - administers Local Area Network of PCs for Education Facility
  - administers Macintosh Education Facility
- high-quality typesetting
- provide image and typed text scanning
- installs and maintains application packages
- administers site licenses for various software packages

Telephone Listings

Consulting and Enquiries

Applications Support & Advising Supervisor	Alex Nishri	BC214	978-7109
External Marketing Consultant	Ihor Prociuk	BC217	978-6875
Erindale College	Joe Lim	ER2035	828-5311
Information Office	Evelyn Ward	BC201	978-4990
Account & Access Code Enquiries	Sylvia May	BC101B	978-7148
IBM & Macintosh Maintenance	Kam Mark	BC103	978-5050
Tape Library (Academic Services)	Susan Kovago	MP368	978-7319
Tape Library (Administrative Services)	Miranda Fong	MP368	978-6693
Communication, Networking & Hardware	Rosi Derka-Tseu	BC105	978-7087
UTCS Noncredit Short Courses	Irene Rosiecki	BC217	978-4565

Consulting & Advising Services:	978-HELP
CMS, and GP UNIX userids:	ADVISOR
CMS Userid for mail problems:	POSTMSTR
Network Operations Centre	978-4621
System Status Enquiries (GP UNIX)	978-4318
System Status Enquiries (IBM)	978-7393
Interactive Services 300 (bps)	978-3959
Interactive Services 1200 (bps)	978-3959
Interactive Services 2400 (bps)	978-7239
Interactive Services 9600 (bps)	978-7220

UTCS Directory

Director:	Dr. Warren Jackson	BC118	978-8948	wcj@vm.utcs.utoronto.ca
Associate Director:	Eugene Siciunas	BC116	978-5058	eugene@vm.utcs.utoronto.ca
Managers:				
Communications & Technical Support	Norman Housley	BC121B	978-4967	norman@vm.utcs.utoronto.ca
Information Centre	Don Gibson	BC217	978-7331	don@vm.utcs.utoronto.ca
Internal Systems Support	Ron Vander Kraats	BC121A	978-4428	rvk@vm.utcs.utoronto.ca
Operations Support	Dr. Bob Chambers	MP350	978-7092	
Systems Support	Bill Lauriston	MP331	978-3579	bill@vm.utcs.utoronto.ca

Committees on Computing

Supercomputer Users' Group at U of T	Chair	Prof. W.R. Peltier	978-2938
Research Board Standing Committee on Computing	Chair	Prof. C.C. Gotlieb	978-2986

Legend:
BC = Bancroft Building
ER = Erindale
MP = McLennan Physical Labs

* NetNorth/BITNET/EARN

Terminal & Advising Sites

Names and Locations

Central Advising Office (CAO), 978-HELP
Engineering Annex (EA, CDF), 11 King's College Road, Rooms 107, 107B, 201
Erindale College (Erin), 828-5339, 3359 Mississauga Road North, Erindale Campus, Rooms 2037, 2039A-B-C, 2045
Ramsay Wright, 25 Harbord St., Rooms 211, 212, 213
Robarts, Robarts Library, 130 St. George St., Room 1061A
Sidney Smith (Sidney), 100 St. George St., Room 1071
St.Michael's College, 121 St. Joseph St., Room 107
Trinity College, 6 Hoskin Ave., Room 024
Victoria University, 73 Queen's Park Cres., Room 208

Access Hours

Sites	Hours of Access				Restrictions*	Advising
	Mon-Thurs	Fri	Sat	Sun		
CAO	10:00-18:00	10:00-18:00	closed	closed	Research	978-HELP
CDF	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	No
EA	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Erin (2039)∆	9:00-17:00	9:00-17:00	12:00-16:00	12:00-16:00	Research	Rm 2005
(2045-46-47)	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	Rm 2005
(235)†	8:00-22:00	8:00-17:00	closed	closed	None	Rm 2046
Robarts	8:30-24:00	8:30-24:00	9:00-22:00	13:00-22:00	None	978-HELP for Research
Sidney	7:00-24:00	7:00-24:00	7:00-24:00	7:00-24:00	None	978-HELP for Research
St.Michael's	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Trinity	8:00-22:00	8:00-22:00	8:00-22:00	8:00-22:00	None	978-HELP for Research
Victoria	8:30-21:00	8:30-21:00	8:00-13:00	8:00-13:00	None	978-HELP for Research

Sites	Advising Hours
CAO	Monday through Friday, 10:00 - 18:00
Erin	Monday through Friday, 09:00 - 22:00

Legend

* Research includes graduates, faculty, staff.
∆ Key access available.
† Access restricted to building hours.

Computer and Printer Access

Sites	PACX	Printers	CDF/PC Microcomputers	CQUEST Workstations
CDF	N	Y	N	
EA	Y	Y	N	
Erin	Y	Y	N	
Ramsay Wright		Y**		Y
Robarts	Y	Y	Y †	
Sidney	N	Y	Y††	Y
St.Michael's	Y	Y	Y††	
Trinity	Y	Y*	Y††	
Victoria	Y	Y*	Y††	

(Y=yes, N=no)
* CDF/PC only ** Site Only † NEC †† TI/PC

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